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CONTENTS

NATIONAL POLICY AND ISSUES

Economic Structure, Energy Resources Should Be Matched
(Zhang Siping; SHEHUI KEXUE YANJIU, 15 Jul 80) 1

Economic Journal Discusses 'Abstract Labor'
(Peng Dixian; JINGJI YANJIU, 20 Sep 80) 10

Development of Pedagogical Economics Urged
(Yu Guangyuan; JINGJI YANJIU, 20 Aug 80) 18

ECONOMIC PLANNING

Individual Economy Does Not Mean Rebirth of Capitalism
(Xiao Luan Yuan; NANFANG RIBAO, 23 Aug 80) 24

Reasons for Drop in Jiangnan Coal Production Reviewed
(Du Zhenbiao; JINGJI GUANLI, 15 Aug 80) 29

FINANCE AND BANKING

Briefs
Heilongjiang's Qiqihar Municipal Revenue 34

ENERGY

Xizang Develops Geothermal Energy
(JIEFANGJUN HUABAO, Oct 80) 35

Briefs
Jilin Power Output 36

INDUSTRY

Balance Between Self-Reliance, Foreign Borrowing Vital
(Shen Yurui; CHUANBO GONGCHENG, 1 May 80) 37

Titanium Alloy Hydrofoil Proves Superior to Steel
(Yu Tong, Wang Chunmao; CHUANBO GONGCHENG, 1 May 80) 42

Briefs
TV Set Price Reduction 49
Guangdong Industrial Development 49
Anhui Commodity Circulation 49
Heilongjiang Light, Textile Industries 49

CONSTRUCTION

Briefs

Liaoning Terminal Port Building 50
Liaoning City Construction 50
Tianjin Housing Circular 50
Tianjin Housing Problem 50
Tianjin Dormitory Problems 51

LABOR AND WAGES

Briefs

Nei Monggol Businessmen-Industrialists Federation 52

TRANSPORTATION

Importance of Inland Water Transportation Expounded
(Pan Jiahua; RENMIN RIBAO, 29 Aug 80) 53

Briefs

Jiangsu Express Waterway 55

GENERAL

Briefs

Jiangsu Exhibition 56
Hebei Regulations 56
Hebei County Enterprise Management 56

ECONOMIC STRUCTURE, ENERGY RESOURCES SHOULD BE MATCHED

Chengdu SHEHUI KEXUE YANJIU [SOCIAL SCIENCES RESEARCH] in Chinese No 4, 15 Jul 80 pp 52-56

[Article by Zhang Siping [1728 1835 1627]: "The Relationship Between Energy Consumption and the National Economic Structure"]

[Text] Energy resources pose a problem which merits serious consideration in our national economy today. With the continued progress in both industrial and agricultural production and the steady rise in the people's living standards in this country, the contradiction between supply and demand of energy is becoming sharper and sharper each day. It is therefore imperative to find as soon as possible the correct way and method of rationally solving the problems related to energy resources.

How should we solve the energy problem? I think, on the one hand, "exploitation and control" of energy resources must be aggressively carried out to solve the problem of adapting energy resources to the national economic growth. On the other hand, there is the adaptation of national economic growth to the exploitation and utilization of energy resources, or the problem of how to establish a rational economic structure; in other words, how the proportion of the various components of the national economy should be adjusted according to the present status of our energy resources. In this article these matters will be discussed, with an emphasis on the relationship between energy resources and adjustment of the national economic structure.

I.

To solve the energy resource problems of this country, be it for the present or for the long range, we must emphasize accelerating the exploitation and construction of the energy resource industry, increasing new production capability, expanding utilization of energy resources, and stressing reducing consumption and taking measures to save energy. "Exploitation and control" are no doubt important ways leading toward a solution of the energy problem. However, we must also understand that "exploitation and control" must be regulated by the entire national economic growth as well as the scientific and technological level. Discussion of "exploitation and control" detached from the social economic and technological conditions is impractical.

As to "exploitation," the energy consumption growth rate (i.e., the average growth rate of energy consumption divided by the average growth rate of total industrial and agricultural production) in this country is far greater than that in most industrially developed countries. A preliminary estimate indicated that in order to maintain a national economic growth rate of 6-8 percent, an increase in energy consumption equivalent to 70 million tons of raw coal per year would be required. At present, the national economy is being overhauled in this country. Various economic enterprises are rising from the ruins. Regardless of how the nation gives its first priority to the exploitation of energy resources, investment in exploitation of energy resources cannot be increased as significantly as desired on account of our small resource. Moreover, the disorder within the energy resource industry itself needs to be straightened out first. New construction usually requires a larger sum of investment and takes a long period of time. If we were to start construction now, the units would not be able to produce before 1985, and it would be even later before they would be able to demonstrate their full capacity. Moreover, activities related to research and application of energy resources were put on the agenda only recently, so "exploitation" of energy resources in terms of scale and rate during the 1980's will be small and low. Obviously, the short-range energy resource problems of this nation cannot be solved by "exploitation" alone.

As for "control," the utilization rate of energy resources in this country today is very low, with serious waste and a great potential for saving energy. Activities related to energy-saving measures carried out in the past have shown significant results, and efforts to save energy must be continuously pursued in the future. We must understand, however, that past achievements in saving energy were achieved through strengthening enterprise management and through small reforms in technology and equipment. According to what experiences here as well as abroad have revealed, the energy thus saved amounts to approximately 20-30 percent of the total energy savings that can be achieved. A larger energy saving can be achieved only through greater reforms of technology, equipment, and material and through a raising of scientific and technological standards. These reforms and this raising require a large volume of financial and material power and a considerably longer period of time from research to application. Therefore, with the passage of time, and as we get deeper into energy-saving work, the potential for saving energy will grow bigger and the degree of difficulty in accomplishing the task will also become bigger. The equipment and technological processes employed by our industry and transportation enterprises today are quite backward. Renewal and remodeling of various items of equipment have been very slow for many years. Take the steel industry, for example. Steel refining using open-hearth furnaces consumes from five to eight times more energy than steel refining using revolving furnaces. The use of revolving furnaces has thus increased significantly in every major steel-producing country. Steel-refining technology using open-hearth furnaces was phased out completely in Japan in 1977. In our country, steel refining using open-hearth furnaces still occupies approximately 40 percent of total steel production. At the same time, a series of new technologies and techniques--including, for example, dry-smoldered coke, spherical ore, continuous ingot-casting, direct hot rolling, and utilization of waste heat from the steel industry--are being popularized abroad today in order to save energy. The steel industry of this country today uses practically the same old technology and equipment of the 1940's and 1950's. It is evident that with this country's present technological standards, the amount of energy that can be saved by strengthening enterprise management alone is very limited. While reforms of technology and equipment must be supported by national investment, reforms will be restricted by such factors as manufacture of mechanical equipment as well as technical and technological research activities. These matters cannot be accomplished in a single day. Therefore, no matter how important the control of energy resources may be, we must be honest and practical in estimating the potential energy-saving power of this country. We must not simply charge the responsibility of solving energy resource problems to the activities related to energy-saving measures alone.

Now then, how do we solve the energy resource problems of this country? I think that, while we are trying "exploitation and control," we must also consider readjustment of the economic structure as one of the strategic measures.

An energy resource industry is an industry which supplies the national economy with fuel, power and raw materials. The great majority of its products are usually not consumed as end-products. As such, the number of products produced by the energy resource industry and the utilization rate of energy resources alone cannot directly and completely reveal the terminal effects and benefits of energy resources on the national economy. From basic socialist economic laws, how well the problems of energy resources have been solved should be measures not only by the number of products and the utilization rate of energy but also, more importantly, by whether there has been produced a maximum amount of end-products, in line with the demands made by the people's lives, while consuming a minimum amount of energy resources; in other words, producing more terminal products from the same amount of energy resources. To be able to do this, it becomes a question not only of the quantity of energy resources and the energy resource utilization rate, but also of the national economic structure.

The relationship between the national economic structure and energy resource consumption is very close and intimate. It is one of the decisive factors determining the energy resource growth rate of a nation or an area. The national economy is an integral body consisting of many parts. The consumption of energy and the effect of energy usage of each part are different from those of each other part. Some parts may consume little energy while producing larger quantities of a larger number of end-products with good profit, while others may do just the reverse. The total production and the number of end-products of a country are determined not only by the amount of energy consumed and by the energy utilization rate, but also by the composition of various parts in the national economy and the distribution of energy resources among these component parts; in other words, by the national economic structure. From the same amount of energy resources and energy utilization rate, a different economic effect or a different quantity of end-products will be obtained from a different national economic structure and from the different way in which energy resources are distributed among the components.

The largest energy consumer in the entire national economy is industry, and the chemical industry is among the top heavy energy consumers. For example, such industries as colored metal, ferrous alloy and synthetic ammonia consume more than 3 tons of fuel per ton of product, while light and textile industries and various machinery manufacturing industries consume less than 1 ton of fuel per ton of product. If industry occupies a large proportion of the national economy, and especially if the proportion of energy-intensive industries is large and these industries are expanding rapidly, then the quantity of end-products produced from a given amount of energy resource will be small. Conversely, if those industries which consume a relatively small amount of energy and produce a large number of products with high profit are expanded aggressively, a larger number of end-products can be produced from the same amount of energy resource. At present, light and textile industries in this country are weak and there is a shortage of daily necessities. To solve energy resource problems according to basic socialist economic laws, when there is a shortage of energy resources we must readjust our national economic structure, especially the internal structure of industry. We must emphasize the development of such industries as light and textile industries, which consume less energy and produce more with larger profit as important guidelines for national economic growth.

II.

Ever since liberation the energy resource industry of this country has experienced rapid progress. The energy resource production standards of this country today have reached a certain level. Electrical energy production occupies the seventh position in the world; coal production, third place; and petroleum production, eighth place. The total energy resource consumption of this country in 1978 was equivalent to 570 million tons of standard coal, which put it in third place in the world, behind only the United States and the Soviet Union. However, we were still experiencing shortages of fuels and power, and sustained growth of the national economy was severely affected. To be sure, the imbalance between supply and demand and the low rate of energy resource utilization were important causes leading to these conditions, but the irrational structure of our national economy was also to blame.

To explain this problem further, let us take a look at the difference in the effects and benefits produced by various components of the national economy as a result of energy resource utilization. In 1978, for example, from every unit of electrical energy used in heavy industry, a product valued at only 1.73 yuan was produced (0.78 yuan in case of the metallurgical industry), while a product valued at 5.44 yuan was produced by light industry, and 6.12 yuan from the textile industry. In the first half of 1979 in Shanghai, from every unit of electrical energy used in the production of pig iron, a product valued at only 1.65 yuan was produced, while the value was 0.18 yuan for caustic soda, 0.25 yuan for synthetic ammonia, 10.45 yuan for bicycles, 4.93 yuan for cotton cloth and 2.69 yuan for cotton yarn.

It is evident from these figures that there exists a considerably large difference in the effects and benefits obtainable from the same amount of energy when it is consumed by various types of industries to produce various types of products. In the beginning, when we attempted to develop heavy industry properly, we should have taken into consideration the large population of this country and its weak industrial background, together with the different effects and benefits obtainable by different industries from the same amount of energy resources, and we should have put more emphasis on the development of light and textile industries in order to provide more and more end-products for the people and to satisfy the ever-increasing demands created by the people's rising living standards. However, ever since "2-5"[the Second Five-Year Plan], the guidelines of our economic work have onesidedly emphasized "steel as the principle" and thus developed heavy industry, which is highly energy-intensive, disproportionately yielding a small quantity of products. The national economic structure has tilted heavily in favor of heavy industries, focusing on steel and iron, and the development of light and textile industries have slowed down. The proportion of investment in various components of industry between 1952 and 1977 was as follows: metallurgical industry, 11.6 percent; chemical industry, 6.3 percent; textile industry, only 2.5 percent, and light industry, only 2.8 percent of total national economic investment.

As a result of the change in investment distribution, a significant change in the proportion of heavy and light industry products was also created. Heavy industrial production increased from 26.4 percent of total industrial production in 1949 to 56.9 percent in 1978, while light industrial production dropped from 73.6 percent in 1949 to 43.1 percent in 1978. Metallurgical industrial production increased from 5.9 percent in 1952 to 12.4 percent in 1978, while textile industrial production decreased from 27.5 percent in 1952 to 12.8 percent in 1978.

This kind of change in our national economic structure over the past 30 years has increased the proportion of heavy industries which are energy-intensive and produce less and has decreased the proportion of light and textile industries which consume less and produce more. This irrational economic structure has also determined the proportion of energy distribution over various components of the industry. Take electricity as an example. The per unit electricity production of light industry was found to be 3.2 times that of heavy industry, and that of textile industry was 7 times that of the metallurgical industry. The electric energy consumption of heavy industry was 53.7 percent of the total electric energy consumption of the national economy; the metallurgical industry, 17 percent; and light industry, only 12.8 percent. During the period from 1949 to 1978, industrial electric energy consumption increased 68.5-fold: heavy industrial consumption increased 111.5-fold; the metallurgical industry, 191.4-fold; the chemical industry, 239-fold; while the increase was only 25.8-fold for light industry. Total industrial production per 10,000 tons of standard coal was 7.68 million yuan during the "1-5" period, 5.69 million yuan during the "2-5" period, 7.39 million yuan during the "3-5" period and then it dropped to 6.93 million yuan during the "4-5" period. According to the different industrial components, the energy consumed by the metallurgical industry in 1978 occupied 16 percent of the total national energy consumption, its electrical energy consumption was 17 percent of the national economic consumption, while its production occupied only 8.8 percent of the total industrial production. Chemical industry's electric energy consumption was 17.3 percent of the national economic consumption, but its production was only 12.5 percent of the total industrial production. I must call your attention to the fact that the metallurgical and chemical industrial energy consumption figures referred to above were calculated by using the direct consumption coefficient. If we calculate them by using the complete consumption coefficient (direct and indirect consumption), then the number will be much larger.

We must also recognize the grave consequences to the national economy of the irrational distribution of energy resources as determined by the economic structure. For example, electrical energy consumption of this country in the first half of 1979 increased 13.8 percent over that of the same period in 1978, while the increase in production was only 4.1 percent. In addition to the fact that energy consumption per unit of some major products has increased, an analysis of the economic structure indicates a faster growth in heavy industry than in light industry during the first half of 1979. Compared with the same period of 1978, light industry has shown a growth of only 1.5 percent. The five industries including steel, colored metal, chemical, building materials, and petroleum consumed 7.56 billion more units of electrical energy in [the first half of] 1979 than during the same period of 1978. If this amount of electrical energy had been used in the light and textile industries, an extra quantity of production valued at 13.57 billion yuan could have been produced, and the industrial growth rate in the first half of 1979 would have been raised from 4.1 percent to 10.6 percent.

The effects and benefits of energy resource consumption on the national economy have an intimate relationship with the technical structure as well as with the economic organizational structure. Generally speaking, medium to small enterprises consume much more energy per unit of production than do large enterprises. Technically backward industries consume more energy than technically advanced industries. "Big and complete" and "small and complete" industries consume more energy than specialized industries and joint enterprises. Take the "five small" industries, for example. The average fuel consumption per ton of steel by the local small steel plants in 1978 was 2.5 to 3 tons, while consumption by the key steel plants was only 1.4 tons. Small nitrogen fertilizer plants consumed 3.23 tons of coal and 1,774 units of electric energy, which were 124 percent and 16 percent greater, respectively, than those of medium and large enterprises. The present state of our enterprise structure is characterized by more medium and small enterprises, more "big and complete" and "small and complete" enterprises, and more technologically backward enterprises. This kind of enterprise structure can only gravely affect the effects and benefits of energy resources on our national economy.

It is evident that in order to fundamentally solve our energy resource problems and increase the effects and benefits of energy resources on our national economy, we must reorganize our national economic structure step-by-step at the same time as we implement "exploitation and control." Based on the characteristics of the energy resource level and energy production level of this country, we must more aggressively expand the light and textile industries, which consume less energy, and reduce accordingly the growth rate of heavy industry and the production of those products which are highly energy-intensive, so that more end-products which meet demands may be produced from less consumption of energy resources. If the present irrational energy structure were to be maintained, heavy industry would become heavier and light industry lighter, and a satisfactory and rational solution to our energy resource problem could never be worked out, even if we were able to achieve a significant increase in the production of energy resources and raise the energy utilization rate, because of the irrational economic structure and the consequent irrational energy resource distribution pattern.

III.

It is clear from the above analysis that in order to solve the energy resource problems of this country and reap the maximum national economic effects and benefits from our energy resources, we must pay close attention to the mutual compatability between exploitation and utilization of energy resources and the national economic structure. On the one hand, we must emphasize "exploitation and control" of energy resources in order to satisfy the needs created by the people's ever-increasing living standards and the rapidly growing national economy. On the other hand, we must construct step-by-step a rational national economic structure which will be appropriate for our present energy resource status. These two must correspond with each other and expand proportionately, so that more and better end-products can be produced under given conditions of energy resource production and development.

To be sure, reorganization of the national economic structure, as with "exploitation and control," has its own problems and difficulties, and a certain definite process must be followed. Furthermore, from another viewpoint, this involves larger areas, is more complex, and if not done well will bring a greater loss to the national economy. For many years we paid more attention to investment for the exploitation of energy resources and strived for a corresponding growth in energy resource production paralleling national economic growth. We paid little attention to our energy resource structure during the process of shaping and developing our national economic structure. We have not tried to match our national economic structure with the current energy resource situation. We have only blindly constructed a large number of energy-intensive heavy and chemical industries. As a result, quite a few newly constructed enterprises could not begin production or could not fully demonstrate their production capacity because of the shortage of energy resources, and thus they incurred large losses. What needs to be emphasized is the fact that the national economic structure must be compatible not only with the quantity of energy resources but also with the internal structure of energy resources. The major energy resource product of this country is coal, making up 70 percent or so of the total energy resource product today. This feature must be taken into consideration when we select raw materials and fuel supplies. In the past, we neglected this fact when we remodeled or expanded a number of oil-burning electric power generation stations and chemical industries, using petroleum and natural gas as the raw materials. As a result, coal chemical industries have not had a chance to develop sufficiently. A situation was created in which, owing to the shortage of oil and gas, many industries were unable to display fully their production capacity. Some were [illegible] forces to remodel their furnaces from oil-burning back to coal-burning, thus wasting a large quantity of manpower, materials and finances.

Based on the characteristics of this nation, the present status of its economic structure, and the projected trend of the future "exploitation and control" of energy resources, we consider that, with respect to the entire national economy, the national economic structure must match the energy resource status, and the proportion between industry and agriculture and the proportion between heavy and light-textile industries must be readjusted step-by-step. Development and construction of energy-intensive heavy and chemical industries must be reduced properly, while development and construction of light and textile industries must be increased. Development of "labor-intensive" and "knowledge-intensive" industries (such as electronics, computers, precision machinery, and traditional handicrafts) should be accelerated, thus readjusting the technical structure as well as the economic organizational structure step-by-step.

Readjustment of the economic structure is an extremely complex problem which involves the entire national economy. It requires a unified leadership and unified planning carried out at the national level. The nation must take into consideration various factors and strive to achieve an overall balance. Given an energy production level and an energy utilization rate, the growth rate of the various parts must be determined and the distribution of energy resources must be determined accordingly, in order to draft an optimum plan that will maximize the national economic effects and benefits from consumption of a given amount of energy resources. A national plan will then be passed down to lead and reshape the national economic structure to be compatible with the energy resource status. At the same time, we must also introduce various economic policies and measures, including economic legislation, utilization prices, taxes and credit loans, in order to change our national economic structure step-by-step.

It must be pointed out that the problem concerning the two aspects that must correspond to one another as discussed above, exists likewise within the economy of each area.

This country has an enormous land area, so that there are a great variety and variations of natural resources, natural economic conditions, and original industrial backgrounds in different areas. Each area has its most suitable type of industry and product, and likewise its least suitable or outright unsuitable type of industry and product. According to Marx' principle concerning division of labor and cooperation of labor districts, each area must strive to develop its "strong points" according to its local conditions and avoid its "weak points," thus establishing its own unique economic structure. Energy resources are one of the most important natural resources and constitute an important material that is indispensable to many modern production processes. The distribution of natural resources of this country is highly uneven, and long-distance transportation is not very convenient. In order to match the local economic structure with the local energy source conditions, in areas where energy resources are abundant this "strong point" must be fully exploited by the aggressive development of energy-intensive heavy and chemical industries. In areas where energy resources are scarce, this "weak point" must be avoided by not developing energy-intensive industries but instead developing unique energy-saving industries. Only after each area has established its own unique industrial structure, emphasizing its own "strong points" according to its local energy resource situation, will it be possible to establish on this foundation a rational national economic structure compatible with our national energy resource characteristics.

In the past we did not pay much attention to energy resource conditions in shaping the local economic structure of an area. In nine southern provinces where energy resources are poor, large investment sums were blindly poured into the development of energy resources, with very disappointing results. At the same time, construction of energy-intensive industries was forcefully carried out, creating such passive situations as an energy shortage and a shortage of transportation, thus stifling local economic growth. On the other hand, we were also guilty of not taking advantage of the "strong points" of certain areas characterized by an abundance of energy resources, and of failing to build a local economic structure to match abundant energy resources. For example, Shanxi is the top coal-producing province in this country, with superior conditions for the development of a coal industry. This area is also rich in copper, lead and iron ore, together with nonmetal mines such as gypsum, saltpeter, and lime. In the past, construction did not pay careful attention to Shanxi's "strong points" during the course of establishing its local economic structure compatible with its energy resource situation. Not only has Shanxi not been developed into one of the strong energy resource bases of this country, but such energy-intensive industries as electric power, metallurgy, chemical and building materials have not been developed around the rich coal mines. Shanxi's "strong points" have not been exploited fully.

It is understandable from these observations that the best economic effects will be obtained if each area established its own unique economic structure by capitalizing on its local strong features and strives to develop a socialist commodity economy. Energy-poor regions should develop superior energy-saving light and textile industries and other processing industries, and exchange their products for the steel, coal and basic chemical products produced in energy-rich regions. Thus, under a unified national leadership, each area may fully demonstrate its strong points and the nation may reap the maximum economic benefits.

Readjusting and changing our national economic structure in such a way as to match the energy resource situation is not only necessary and possible but also has shown definite results. According to the eight-character guidelines for "readjustment, restructuring, consolidation and improvement," published in 1979, as efforts related to saving energy have been aggressively pursued, the guidelines concerning the development of light and textile industries as the first priority have been carried out at the same time. Under the conditions of an energy shortage, the energy needs of the light and textile industries have been guaranteed. As a result, light industry has grown 9.6 percent, while heavy industry has increased 7.7 percent. Thus, the growth rate for light industry has surpassed that for heavy industry, with an increase in total energy consumption of only 3 percent and an increase in total industrial production of 8.5 percent. As long as we maintain the correct guidelines in the future, promoting "exploitation and control" to meet the demands created by the rapidly growing national economy on the one hand, and paying attention to adjusting the economic structure so that the national economic structure will correspond with the potential level of energy source exploitation and utilization on the other hand, we will be able properly to solve our energy resource problems in conjunction with the construction of the four modernizations.

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NATIONAL POLICY AND ISSUES

ECONOMIC JOURNAL DISCUSSES 'ABSTRACT LABOR'

HK271316 Beijing JINGJI YANJIU in Chinese No 9, 20 Sep 80 pp 3-8

[Article by Peng Dixian [1756 6611 03411] of the People's Government of Sichuan: "Karl Marx on Abstract Labor"]

[Text] The dual character of the labor embodied in commodities is a major problem in the history of economic theory. The bourgeois economists before Marx had never resolved this problem. "The classical school of political economics has never expressly and with full consciousness distinguished between labor as it appears in the value of a product and the same labor as it appears in the use value of that product." (Marx: "Das Kapital," vol 1, The People's Press 1975 edition, p 97, footnote 31.) They found themselves in a difficult position in the theory of labor value. The English classical economist, Adam Smith, left aside various concrete forms of labor and proclaimed that "labor was generally" the sole source that created society's material wealth. In the area of labor value theory he had advanced one step forward compared with the bourgeois economists before him. However, he incorrectly maintained that the labor which created the use value of commodities was the same as or identical to the labor which created the value of commodities. He did not distinguish abstract labor from concrete labor. On one hand, he "confused the determination of value by means of the quantity of labor expended in the production of commodities, with the determination of the value of the commodities by means of the value of labor...On the other hand his concept that labor so far as it manifested itself in the value of commodities counted only as expenditure of labor power, but he treated this expenditure as the mere sacrifice of rest, freedom and happiness, not as the normal activity of human beings too." (Ibid, p 60, footnote 16.) Therefore, the implications of the "general labor" that he put forward were not equivalent to abstract labor and his labor value theory was far from developed. The English classicial economist, David Ricardo, advanced one step further than Adam Smith. He realized the distinction between the use value and value of commodities. He summarized value as the labor time and always adhered to the theory that labor determined value. However, because of the limitations of his own bourgeois class status and his metaphysical methodology, he regarded the capitalist mode of production as an eternal and invariable social foundation and and not examine objective economic processes from the viewpoint of the movement of contradictions, from the viewpoint of development and from the historical viewpoint. Consequently he could not understand that the labor which produced value was a special historical category. He "had not the least idea that when the difference between various kinds of labor is treated as purely quantitative, their qualitative unity or equality, and therefore their reduction to abstract human labor, is implied." (Ibid, p 97, footnote 31.) Therefore, he could not expose the dual character of the labor that produces commodities. Although on one hand he thought that the socially necessary labor time determined the value of commodities, on the other hand he took the creation of value as an inherent attribute of labor. Thus, he inevitably came to the wrong conclusion that all labor in society, and even the labor of an isolated producer living as Robinson Crusoe did on an uninhabited island, could produce value. Therefore, his theory of labor value was not thorough. Marx critically inherited the English classical political economy and founded the theory of the dual character of labor in the production of commodities. "Marx analyzed labor as to its capacity for producing value, and he was the first to ascertain /what kind of/ [passages within slantlines printed in boldface] kind." (Engels: "Preface" to "Das Kapital," vol 2, p 22.) Marx's theory on the dual character of labor started a great revolution in political economics. It correctly explains both the form and the substance of value and enables the theory of labor value to be established on a scientific foundation. Hence it scientifically explains the theory of surplus value and solved a series of problems in political economics. Therefore, Marx's theory on the dual character of labor was a creative development in his theory of labor value. It is "the key to understanding political economics." (Marx: "Das Kapital," vol 1, p 55.) Moreover, Marx revealed the general laws of the commodity exactly on the basis of this scientific theory of labor value, and the commodity economy still exists in the socialist economy. Therefore, it is not only of great theoretical significance, but also of definite practical significance to understand correctly and study indepth this great theory of Marx, in particular the problems about abstract labor in this theory.

I

The theory of the dual character of labor was put forward by Marx in Chapter 1 of Part 1 of "Das Kapital," volume 1.

Marx profoundly revealed that the dual character of commodities originates in the dual character of labor embodied in them. He argued that abstract labor and not some other kind of labor produces value. He said: "On one hand all labor is, speaking physiologically, an expenditure of human labor power, and in its character of identical or abstract human labor, it creates and forms the value of commodities. On the other hand, all labor is the expenditure of human labor power in a special form and with a definite aim, and in its character of concrete useful labor, it produces use value." (Ibid, p 60.) Because abstract labor is the identical human labor which forms value and it is the substance of value, and because value reflects certain production relations, therefore, abstract labor is not just the expenditure of human labor power in the physiological sense. In other words, abstract labor does not simply mean the use of man's brain, muscles, nerves and sensory organs in the physiological sense, but is the social and historical form of such usage. [HK271318] Thus, it can be seen that first, abstract labor is a category of the relations of social production and not simply a category in the physiological sense, and second, it is a category peculiar to commodity economy and is a historical category; it is not an eternal category common to all social economic systems.

II

The implications of abstract labor have been described above. However, some comrades may think first that because abstract labor is the expenditure of human labor power in the physiological sense, therefore it is an eternal category. Therefore, they think that the dual character of labor is the common characteristic of all labor in history that creates the products of labor.

We think that this view is unfounded. In "Das Kapital" Marx clearly said that concrete labor and abstract labor are the dual character of labor embodied in commodities, and not the alleged dual character of labor embodied in general products of labor which are not commodities. He clearly said that abstract labor is that which produces the value of commodities and is the substance of value. As value reflects the relations of commodity production, so does abstract labor reflect such relations. As value is a product of the commodity economy, so is abstract labor. We all know that social division of labor and private ownership are the prerequisities of the commodity economy as well as the source of the contradiction between private labor and social labor. Labor must belong to society and social division of labor must signify the social links among the producers and signify that each producer works for the others. However, the private ownership of the means of production and the products of labor separates people into independent producers and turns the labor of the commodity producers into private labor. Thus, private labor cannot be directly manifested as social labor and can only be indirectly manifested as social labor through commodity exchange and by taking the form of abstract labor. Marx said: "Directly speaking, commodities are the products of the private labor of individuals who are isolated and mutually independent. Such private labor must be proved to be general social labor through transfer in the process of private exchange. In other words, the labor based on the production of commodities can become social labor only through the complete transfer of individual labor." ("Collected Works of Marx," "A Critique of Political Economies," vol 13, p 75.) He also said: "Scattered individual labor is the prerequisite of the labor embodied in exchange value. Such individual labor can become social labor only through taking a form directly contradictory to itself, namely, the abstract and general form." (Ibid, p 22.) Therefore, though under any social conditions labor is the expenditure of general human labor power in the physiological sense, yet only under the conditions of commodity exchange does it adopt the form of abstract labor which forms commodity value, and therefore only the labor that produces commodities can display the dual character of concrete labor and abstract labor.

When discussing the thesis that abstract labor is a category peculiar to the commodity economy, Marx also said that the concrete labor that produces a product of labor or a kind of use value is "a purposeful activity to take possession of natural objects in some particular form. It is the natural condition for man's existence. It is a condition of the material exchange between man and nature independent of all social forms. On the contrary, the labor that produces exchange value is a special social form of labor." (Ibid, p 25.) He also said: "The analysis of exchange value reveals that the condition for the labor which produces exchange value is the social stipulations on labor, or, the stipulations on social labor. However, what we call society here is not the general meaning of the word, but a special meaning. It is a special social attribute. First, the simplicity of labor marked by no differentiation differs from the identical nature of individual labor. Such simplicity is the interrelationship between the individual's labor in its nature as identical labor. Of course, actually all labor is transformed into labor of the same kind. If only it can be manifested as exchange value, every man's labor acquires this social attribute of being identical. Moreover, one's labor can be manifested as exchange value only if it enters into a relationship with other individuals' labor, in its nature as identical labor." (Ibid, p 20.) Here Marx clearly said that the labor which produces a product of labor or a kind of use value "is independent of all social forms," and that "on the contrary, the labor that produces exchange value is a special social form of labor." Marx also gave an example: "Take for example the labor of tailoring. Taken as the material stipulation of a special productive activity, it produces clothes, but does not produce the exchange value of clothes. When it produces the latter, it appears as abstract general labor; such labor is part of a kind of social relations, which are not the product of tailoring." (Ibid, p 25.) Thus, Marx clearly proved that abstract labor is a special historical category which reflects the social nature of labor under the conditions of a commodity economy. Marxist classical writers did not take the dual character of labor as a characteristic common to all labor in history that creates products of labor.

Second, some comrades draw the conclusion that abstract labor is a category common to all social systems because of the following fact: Even in a noncommodity economy, people are still concerned about comparing the quantities of labor and they do carry out such comparison in practice; but such comparison can be effected only by means of abstract labor, not concrete labor.

[HK271320] This argument is also incorrect, because it confuses the category of "general labor" with the category of "abstract labor." These two categories differ in principle. We know that labor is a process whereby people create use value through their own purposeful activities. Marx said: During the process of labor, "man as a natural force himself is opposite to the material in nature. To possess natural materials in a form useful to his own living, man uses his natural power--exercising his arms, legs, brain and hands." (Marx: "Das Kapital," vol 1, p 202.) Therefore, whatever the social economic system or specific form of labor, man's labor is invariably the use of his brain, muscles, nerves and sensory organs. This expenditure of human labor power in the physiological sense is general labor. Such labor is the common content of people's labor in all social systems. If different kinds of concrete labor exist in human society, general labor will exist as an economic reality. When such objectively existing general labor is reflected in people's thoughts, people will, by abstraction, arrive at the category of general labor from many different kinds of concrete labor. Therefore, Marx said: "Labor seems to be a very simple category. The idea of labor in its general nature--as labor in general--is also ancient." ("Collected Works of Marx," "Introduction to 'A Critique of Political Economics,'" vol 12, p 753.) Therefore, general labor also exists in a noncommodity economy. For example, in a clan community in a primitive society, to a certain extent and within a certain scope, people adopted the category of general labor in comparing the quantities of labor and in the proportional allocation of social labor. It can be considered that at that time, general labor began to be a real economic category (though it was at a rudimentary stage). Nevertheless, such general labor differs from the abstract labor embodied in commodities. Both links and differences exist between these two categories. What they have in common is that essentially they are both the use of human general labor power (brain, muscles, nerves, sensory organs and so on) and they are both objectively existing things in the physiological sense, not conceptual things. Their difference is that abstract labor is not just the expenditure of general labor power in the physiological sense; at the same time it is the general human labor which shows its social character through commodity exchange and produces commodity value. Abstract labor becomes such general human labor as a result of the process of commodity exchange. As mentioned above, the basic contradiction in a commodity economy is that between private and social labor. As a result of this contradiction, various kinds of private concrete labor must be reduced to qualitatively identical and therefore quantitatively comparable and unified abstract labor through exchange, various kinds of complex labor must be reduced to simple labor and various kinds of labor differing in skill must be reduced to labor of average skill. This process of subjecting various kinds of concrete labor to abstraction does not happen in people's thoughts, but occurs spontaneously in the market at the back of the producers of commodities. Marx said: "People enable their products of labor to become value and thus to enter into relationships with one another. It is not because people view these things as the material forms of the same kind of human labor. On the contrary, during exchange they cause their various products to have value and thus become equal, and so they designate various kinds of labor to become equal as human labor." (Marx: "Das Kapital," vol 1, p 90.) Thus, abstract labor is not equivalent to general labor; the two must not be confused. In a noncommodity economy, people use general labor and not abstract labor for comparing the quantities of labor.

We must also point out here that we must not be divorced from specific historical conditions in examining the social nature and role of the general human labor used for comparison and calculating the quantities of labor. Actually, such social nature and role differ in the various historical stages. As mentioned above, the category of general labor has existed since the time when man's social production had reached a certain stage of development. However, in the various social systems prior to the capitalist society, its social function had been limited to a relatively narrow scope and small extent. It was because during those times division of labor was not well developed, and there existed such trammels within the social systems as religious influences, regional blockade and feudal hierarchies, so that various kinds of labor were limited to narrow domains and there was consequently a lack of practical conditions for general labor to play a relatively great social role. This situation changed only when the capitalist society appeared. The capitalist social system sees the development of the commodity economy in the highest degree. In this social system, because labor power has become a commodity and circulates spontaneously in the market laborers often move from one occupation to another and are engaged in various kinds of labor. Thus, "labor in general" (namely, abstract labor) can become a real category and "a truth in practice." Marx said: "Any kind of labor is treated in the same way and a very well-developed aggregate of practical varieties of labor is taken as the prerequisite. Among these varieties of labor, no single variety will dominate. Therefore, the most general abstraction invariably comes up where concrete objects develop most abundantly; There, one thing is common to many and all. Thus, it can be examined no longer merely in some special forms. On the other hand, the abstraction of labor in general is not merely the mental consequence of the concrete aggregate of labor. To treat any kind of labor in the same way is suitable for that form of society in which one can easily move from one kind of labor to another, in which a given variety of labor is fortuitous and is consequently not different from other varieties. [HK271322] Here, labor is the general means of creating wealth not only in category but also in reality. It is no longer a stipulation which is integrated with individuals in a special sense. This situation is most well developed in the United States, where the bourgeois society exists in its most modern form. Therefore, in that form of society, 'labor,' 'labor in general' and the abstraction of the category of (straightforward) labor, which are the starting point of modern economics, can become things of reality. Therefore, this simplest abstraction, to which modern economics attaches prime importance, and which manifests an ancient relation applicable to all forms of society, can appear as something real aside from its abstract nature only when it is a category of the most modern society." ("Collected Works of Marx," "Introduction to 'A Critique of Political Economy,'" vol 12, pp 754-755.) What Marx mentions here as "labor in general," "to which modern economics attaches prime importance," and which "is a category of the most modern society," refers to abstract general labor which creates value, or abstract labor. The quotation above clearly shows that Marxist classical writers have always studied abstract labor in close connection with specific social and historical conditions. They have always emphasized that abstract labor is a product of historical relations and that this product appears simultaneously with the commodity economy and acquires full practical significance about this point: "This example of labor clearly illustrates that even the most abstract category is a product of historical relations when we talk about the characteristics of this abstraction, though it is applicable to all eras exactly because of its being abstract. Moreover, it has full significance only in connection with and in the context of these relations." (Ibid.) Thus, abstract labor is not a category common to all social formations.

Third, some people may think that in a feudal society, the category of abstract labor also existed because whatever kind of labor the serfs are engaged in, they must supply surplus labor to the feudal lords in the form of feudal rent.

This view is also unsound. Actually, quite to the contrary, in a feudal society the principal aim of production is reflected in the feudal rent which appears as use value. Feudal lords exploit the serfs mainly by means of specific service items and charging payments in kind. The labor which the serfs are engaged in for paying rent is also embodied in various kinds of concrete labor stipulated by the lords to satisfy their needs of livelihood and entertainment. Marx said: "Here (referring to the medieval serf system--note by writer of article quoting Marx), the direct social form of labor is the natural form and specific characteristics of labor, not as in commodity production, based on which the common characteristics of labor are the direct social form." (Marx: "Das Kapital," vol 1, p 94.) Thus, under a serf system the surplus labor which the serfs supply to the feudal lords is particular and individual concrete labor in the natural form. Such specific concrete labor need not be reduced to abstract labor through exchange. An important characteristic difference between feudal rent and the capitalist's profit is that the surplus labor constituting feudal rent adopts concrete special characteristics and not abstract general characteristics. It may be argued from another angle that the surplus labor supplied by various serfs to the feudal lords in various specific forms is also the use of man's brain, muscles, nerves, sensory organs and so on. However, this is just general labor and not abstract labor. Therefore, in a feudal society, the category of abstract labor does not exist.

Fourth, some may think that in a communist society, the comparison of the quantities of labor will become more important; but such comparison requires reducing concrete labor to abstract labor, and consequently the category of abstract labor will be applicable to, and therefore will exist in, a communist society.

This view is also incorrect. True, in a communist society, people must be greatly concerned about the economy of working time as well as the consumption and computation of productive labor. However, by that time socialist public ownership will have developed into unified ownership by the whole people, and therefore the production of commodities will not exist and the labor of each member of society will directly be social labor. Social planning work will be increasingly scientific, accurate and perfect. Therefore, the quantitative comparison of the labor embodied in the products of labor will not have to be done in a roundabout way, that is, by means of the category of value. It can be said that this category will then disappear for good. It will be possible to use the labor time directly as a measure in comparing the quantities of labor. Engels said that in a communist society, "every person's labor, no matter how its particular use is different from the labor of others, will become direct social labor right from the beginning. At that time, the quantity of social labor embodied in a product will not have to be determined by means of roundabout methods first. Daily experience will directly tell the average quantity of social labor needed for making this product. Society will be able to calculate easily the number of working hours embodied in a steam engine, 100 liters of harvested wheat or 100 square meters of cotton fabric of some particular quality. Therefore, because society will directly and absolutely know the quantities of labor embodied in the products, it will not need to represent these quantities with the relative, unstable and inadequate measure which it has been forced to adopt before. This measure is a third product, instead of time--the natural, commensurate and absolute measure for representing the quantities of labor." (Engels: "Anti-Duhring," The People's Press 1970 edition, pp 304-305.) [HK271324] Of course, even in a communist society, to accurately compare and compute the labor consumed in various products, people will have to eliminate the differences of labor in concrete form as well as the differences in individual working times, and take the "average labor time consumed" as the standard for comparing the quantities of labor. However, because planning, surveying, computation and other kinds of work are very scientific and accurate, it will not be difficult for people to determine the "average labor time consumed." It must be pointed out that this kind of "average labor time consumed" does not belong to the category of abstract labor because it will not possess the essential characteristic of abstract labor, that of manifesting the social nature of labor by means of the abstraction--the general characteristic of labor. It will still be the general labor in the physiological sense as mentioned above. Such general labor will not have the characteristic of commodity value. Thus, abstract labor will not occupy a position in the future communist society.

III

The basic cause of these several wrong views about abstract labor is the neglect of the methodology and object of study of Marxist political economics. The primary method in Marxist political economics is that of dialectical materialism. Under the guidance of this method, Marxist political economics takes the law of the unity of opposites as the law governing social and economic development, and takes economic categories as a reflection of objective economic processes in people's thoughts. Under the guidance of this method, Marxist political economics takes the processes of social and economic development as an entity and in this way examines the internal links of this entity as well as the movement of contradictions within this entity. It takes social production relations as contradictions which are moving, developing and changing. It "explains social relations by means of production relations, and production relations by means of the degree of development of the productive forces." ("Selected Works of Lenin" "What Are 'The People's Friends' and How Do They Attack the Social Democrats?" vol 1, p 8.) Consequently, it views the production relations which are compatible with the productive forces as the product of some particular historical stages. Therefore, the method of Marxist political economics is also one of historical materialism. As a result of these dialectical materialist and historical materialist methods, the object of study of Marxist political economics is the production relations in the process of material production at various stages of social development, and Marxist political economy "is essentially a historical science." (Engels: "Anti-Duhring," p 144.)

Just because Marxist political economics is essentially a historical science which takes as its object of study the production relations at various stages of historical development, its economic categories can just be the theoretical representations of certain production relations and can just be some historical categories. For example, surplus value, labor power as a commodity, the impoverishment of the proletariat and so on are economic categories peculiar to the capitalist mode of production and reflecting capitalist production relations. Commodity, value, abstract labor, money and so on are economic categories common to several particular modes of production and reflecting relations of commodity production. Although there are some general economic categories common to various modes of production, such as productive forces, production relations and so on, yet even these most general economic categories possess different characteristics according to different production relations prevailing at different stages of historical development. Therefore, if abstract labor is merely taken as an eternal category in the physiological sense, then this economic category which should have reflected certain production relations will become a category of natural science in the physiological sense, and such a category cannot explain any economic processes. Moreover, viewing abstract labor this way denies the historical nature of Marxist economics. (Editor's note: This article was received in March 1980.)

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DEVELOPMENT OF PEDAGOGICAL ECONOMICS URGED

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[Article by Yu Guangyuan (0060 0342 6678): "Several Questions Concerning the Establishment and the Development of Pedagogical Economics"]

[Text] 1. What is Pedagogical Economics? Can the Sciences of Pedagogical Economics Be Established?

I advocate that the science of pedagogical economics should be established and developed in our nation.

Pedagogical economics studies the economic problems in pedagogy. It can also be said that it studies educational problems from the point of view of economics. Pedagogical economics is a branch of economics. There is a discipline in economics that is called sectoral economics. It specializes in the study of economic problems of each sector of the national economy. Education can be viewed as a sector of the national economy, therefore of all the classifications of economics, pedagogical economics belongs to sectoral economics.

Pedagogical economics can also be said to be a branch of pedagogy. I believe pedagogy is divided into two broad sections--the science of the phenomena of pedagogical cognizance and the science of the phenomena of pedagogical sociology. The former studies education as a kind of cognizance phenomenon and is a branch of the theory of knowledge. The latter studies education as a kind of social phenomenon and is a branch of sociology.[1] Pedagogical economics belongs to the science of the phenomena of pedagogical sociology.

In general, pedagogical economics is economics as well as pedagogy.

Pedagogical economics has its general theories. It discusses the question concerning which stage of development of society and history must be reached for pedagogical economics to become established as a science. It studies the objects, tasks and methods of pedagogical economics, it studies the common problems of pedagogical economics under capitalism and under socialism, it studies the problems of pedagogical economics common to all nations of the world. There are also studies specializing in problems of pedagogical economics under a definite socio-economic system and in a definite nation. We now advocate the establishment of pedagogical economics, which of course will include the former and the latter and which will emphasize the study of the general theory and principles of pedagogical economics under socialism and its application in China.

The relationship between pedagogy and production is an important theoretical question to study in pedagogical economics. The question includes the problem of whether education is a productive sector. But the question of whether education is a productive sector and the question of whether pedagogical economics can be established as a science are not the same question. Some comrades have started out opposing the view that education is a productive sector and have expressed doubt as to whether pedagogical economics can be established as a science. I believe such a view should not be taken. I believe that as long as we affirm that education and economics are closely related, affirm that there are many economic questions in education which must be studied, then the science of pedagogical economics can be established.

Here let us first discuss whether a sector must be a productive sector. Such a general question can only be asked after studying the sectoral economics of this sector. The answer is negative. Economics of course studies production. But here, production includes production, exchange, distribution, and consumption as a whole production process, and is not limited to direct production processes. Therefore, any study of a certain link in the entire production process should be included in economics. For example, commercial economics studies exchange, financial economics studies distribution, consumer economics studies consumption. They are not direct production processes, but everyone agrees that these studies belong to economics. Of course, exchange, distribution, consumption have a great function in direct production, therefore commercial economics, financial economics, and consumer economics also study the effect of exchange, distribution and consumption upon direct production and their function in direct production. Since nobody questions the establishment of these as sectoral economics, therefore the above way of viewing the problem should also receive public recognition. We can thus expand this method to include the study of problems in education. Although education cannot be regarded as belonging to the link of production, exchange, distribution and consumption, it is related to the entire production process of this society. Whether education is a productive sector or not, education occupies an important position in the national economy. If this point is recognized, then the existence of pedagogical economics should also be recognized.

At the same time, there are many economic problems within the educational sector, such as the national budget for education and the problems of the state's financial management of education, the problems of economic results of education provided by schools, etc. Although the party and the state have emphasized education more and more, at any given moment, the state's funds for education will always be insufficient, therefore they must be utilized well, managed well, and thus, to study the problems well, such a field of sectoral economics as pedagogical economics is needed to conduct such studies. This is also one reason that the establishment of pedagogical economics should be affirmative.

II. Why Do We Emphasize the Proposal To Establish and Develop Pedagogical Economics Today?

Now everyone is becoming more and more deeply aware that for our nation to realize the four modernizations education must be greatly developed. It can be seen in the announcement of the Fifth Plenary Session of the 11th Party Central Committee that education work has been elevated to a very important position. The announcement made a special proposal to draw up plans for the educational system and to draw up an educational plan. Not long afterwards the Secretariat of the Party Central Committee was briefed on the problems in education. Comrade Fang Yi [2455 3015] announced the directives regarding the direction of educational work as decided by the Secretariat at a panel discussion meeting. Now the newspapers have launched discussions concerning educational work. Today we elevate educational work to such a high position because it is indeed extremely important to the construction of the four modernizations. The construction of modernization cannot be carried out by people without any education. The machinery and equipment of modernization must be built and operated by technical personnel and engineers and technicians who have received scientific education and technical training. Modernized enterprises must be managed and operated by people who have received education in scientific management. Cadres working in all positions must be people who have received specialized training in school. They must all have a definite level of education. This is not difficult to understand. A further question is to conduct "quantitative" studies to appropriately answer our questions concerning what position education occupies in the construction of modernization and in the entire socialist national economy, and questions concerning how profound it should be. For example, how should the proportional relationship between education and other sectors be arranged so that the relationship would be more correct, how should manpower and material resources be more rationally distributed between education and other sectors. Such questions cannot be accurately answered immediately. This requires further scientific analysis. Only by establishing and developing pedagogical economics, gathering related information domestically and abroad, exploring the scientific methods of studying these types of questions, conducting careful studies of the situation of these aspects in our nation and their problems can the scientific basis for answering the above questions be provided so that decisions can be made when formulating national policies.

The position and function of education in the national economy should not be underestimated nor overestimated. At present, a majority of comrades still underestimates the position of education. Many nations in Europe, and the United States and Japan have realized the important function of education through their own experience. They value the results of "investment in talent" and "intellectual investment" highly. We should learn this. If we conduct systematic studies of these questions according to domestic and foreign experience, then we can use the results of study in these regards to convince those who underestimate the position of education in the national economy.

Now all enterprises in our nation are developing, but in any period, a nation's funds for construction will always be limited. Especially at present our nation is in the middle of the phase of adjustment, and none of the enterprises will be able to receive sufficient funds, therefore there are problems of rational utilization of construction funds. Some of these problems are related to education. For example, now many young people graduate from high school in our nation every year, but those admitted to the universities are very few. Therefore we face the problem of the future of high school graduates. This is a social problem and also an economic problem. There are only two ways to pursue, one is continuation of education or employment. Continuing education provides two alternatives, one is whether to go into university or to receive vocational training. There are also many alternatives in seeking employment. Here there is a series of problems of economic efficiency which must be studies. Economic efficiency is the ratio between the expenditure of labor in a certain social practice (including live labor and material labor) and the results obtained. The problem here is to determine which idea and which plan among the many ideas and many plans for investing in setting up schools and training students or assigning these young people to work can achieve greater economic results. Such a problem is very complex and must be studied by establishing and developing pedagogical economics before a scientific answer can be obtained. During such studies, the following data must be made clear: In making arrangements for one young person to work, how much wages must be paid him a year, how many other investments must be made for him to have the qualifications for employment, here each profession and business is different, they must be studied by categories and the total and the average amounts must be calculated. And what are the amounts needed to make arrangements for a young person to continue his education? Also, when the young person who continues his or her education will face the problem of employment must also be calculated, and what problems will emerge at that time, how much investment would be needed. In conducting this type of studies, what kind of results can be obtained economically at present and in the future when a young person continues his or her education and his educational level is elevated must also be calculated, or what kind of results can be obtained if he or she is given employment, etc. The results of such studies are then used as the bases for analysis of the economic efficiency of different plans. This type of work obviously possesses the nature of a specialized academic study. Without conducting such studies, how can we obtain conclusions for scientific action?

I do not plan to list every reason for establishing and developing studies in pedagogical economics here. The reasons mentioned above are sufficient. I believe, to do the work in education well in our nation, there must be specialists in pedagogical economics (these specialists do not exist now or there are only a few, as such studies are conducted, we will have trained some and the numbers will increase rapidly), there must be specialized institutions for such studies, there must be written works in this field and there must be academic conferences in this field to propose suggestions that are scientifically based for the nation.

III. Is Education a Productive Sector?

We mentioned above the question concerning whether education is a productive sector, which may cause some argument, but this does not prevent us from discussing whether pedagogical economics, as a branch of economics or pedagogy, can be established. This does not mean that this question is not an important and basic question in pedagogical economics. But this question is a very complex theoretical question in political economics. It involves the Marxist theory concerning productive labor and concerning the theory of social production and reproduction. Therefore this question cannot be discussed cleraly in such a short article. Now I can only talk about some ideas directly related to this question in simple terms.

The question whether education is a productive sector is directly related to the question whether educational labor is productive labor. Marx pointed out two different concepts related to productive labor. One is "to examine productive labor from the point of view of simple labor," the other is "productive labor that is a specific productive relation." The former is productive labor viewed from the relationship of material exchange between man and nature. The latter must be those types of labor that manifest specific productive relationships. Labor to produce material resources, as examined from the point of view of simple labor, of course is productive labor. Marx has explained this point very clearly in Chapter 5 of the first volume of "Das Kapital" and many other places. But labor to produce material resources must be qualified by other conditions to become labor that manifests specified productive relationships. Marx illustrated the case of a capitalist who invited a seamstress to come to his home to patch up his pants and showed that this was not capitalist productive labor because it did not belong in the realm of capitalist productive relationships. Capitalist productive labor must be labor that produces surplus values for the capitalist, it must be labor that produces capital, it must be labor that is interchangeable with capital. Labor involved in having the seamstress go to his home and patch up his pants only provided utility value for the capitalist. Therefore whether educational labor is productive labor or not must be viewed from these two different concepts.

Is education "productive labor viewed as a simple process of labor"? This can be answered in the affirmative based on two reasons.

First, educational labor is a part of the total combined labor that produces material resources. Marx wrote in Chapter 14 of the first volume of "Das Kapital": "When the process of labor is taken as a purely individual process of labor, the same laborer combines all the functions that are later separated...They are separated later...The product is converted from being a direct product of the individual laborer to a social product, and a common product of the entire body of workers, i.e., the combination of all laboring personnel. Each member of the entire body of workers directly or indirectly acts upon the object of labor. Therefore, as the coordinative nature of the labor process itself develops, productive labor and its bearers, i.e., the concept of the productive worker, necessarily expands. To engage in production, labor does not necessarily involve personal work now, it is sufficient to be one organ of the entire body of workers and to perform a certain function. The initial definition of productive labor derived from the nature of material production itself has always remained valid for the entire body of workers viewed in its entirety. But, to each individual member of the entire body of workers, it is not appropriate anymore."[1] In a pure individual labor process, the person must complete a certain productive work. Sometimes he needs to learn and study to increase his own knowledge as preparation for directly dealing with the object of labor. Now learning and study of educational function thus indirectly acts as a form of labor upon the work involved in the object of labor and as a form of labor of an organ of the entire body of workers. It should be regarded affirmatively as productive labor.

Second, examining productive labor from the viewpoint of the simple labor process, it should be "either labor for the production of commercial products or labor directly involved in labor capabilities of labor itself for production, for training, for development, for maintenance, and for reproduction." This is because "the entire world of commercial products' can be divided into two parts: The first is capabilities of labor, the second is the commercial product that is different from the capabilities of labor itself. Some labor is used to train and maintain capabilities of labor or to change the form of the capabilities of labor, etc. In general one is to give labor capabilities specialization or to preserve labor capabilities. Marx said: "service performed by teachers in schools (as long as he is 'necessary in production' or useful), services performed by doctors...these services should be included in the cost of producing labor capabilities or the cost of reproduction."[2] Education that provides training in labor capabilities and functions to change the form of lavor capabilities should be regarded as a factor of production.

As to the question of whether education is capitalist productive labor, Marx said: "If an example can be cited from outside the realm of material production, then only a teacher who trains a child's brain and who works for the profit of the school master can be considered as a productive worker. The school master who does not invest his capital in a sausage factory but invests his capital in an education factory has not made any changes in the state of affairs."[3] Therefore, whether education in capitalist production belongs to productive labor depends upon whether it manifests the capitalist productive relationship. In this way the answer is affirmative. Whether education belongs to socialist labor of course is no longer judged by this standard but is judged by whether it carries out this type of labor in the socialist economic organization and whether it takes the satisfaction of the need for education by the society as the goal of its own labor.

Therefore, regardless of which concept of productive labor pointed out by Marx is used, education conducted by our nation and conducted by the socialist collective is basically socialist productive labor. In our nation's entire socialist system, education can be regarded as a productive sector. This is a special productive sector. That it is judged and determined to be a productive sector is based on the function education performs in social production. Education is of course not a sector of direct production, but the goal of education and the content of education are varied and plentiful.

The social duties of education are not limited to serving production. I do not intend to discuss these questions in this article. But there is one obvious point, which is that productive duties of education are the duties that are the most important and that constitute the greatest proportion among the many duties of education. Therefore we say that education should basically be affirmed as a productive sector.

By affirming that educational labor is basically productive labor, education basically is productive force, the education sector is basically a production sector, then in practice, it is beneficial to the development of education in our nation and of our nation's economic enterprises. At the same time we can also see that only by affirming these can a strong and full theoretical basis be established for including those people who engage in educational work as a part of the working class.

FOOTNOTES

1. Marx: "Das Kapital," Vol 1, People's Press, 1975 edition (same in the following), pp 555-556

2. Marx: "Theory of Surplus Value." "Collected Works of Marx and Engels," Vol 26, I p 159

3. Marx: "Das Kapital," Vol 1, p 556

9296
CSO: 4006

INDIVIDUAL ECONOMY DOES NOT MEAN REBIRTH OF CAPITALISM

Guangzhou NANFANG RIBAO in Chinese 23 Aug 80 p 3

[Article by Xiao Luan Yuan [5135 3497 0954]: "Individual Economy Is Not Capitalist Economy"]

[Text] Since the Third Plenary Session was held, the party Central Committee has, based on the economic experience of the past economic construction, and taking into consideration the new historic conditions and new experience gained from practice, allowed, and even encouraged, the existence and development an economic system of individual ownership within a certain fixed range simultaneously with an economic system of ownership by the whole people and an economic system of collective ownership. Today, the number of individually owned industrial and commercial enterprises in cities and villages has been gradually increasing. Just in Guangzhou Municipality alone, from August last year to July this year, more than 6,800 business licenses for individually owned enterprises were issued. These businesses employ more than 7,500 persons. It is evident from the conditions in various areas afterward that development of individual economy has contributed positively to increasing the wealth of the society, to satisfying the needs of peoples' lives, to enriching the market supply and to opening up many opportunities. However, there are a few people who not only refuse to acknowledge these positive impacts brought about by the individual economy on the present stage, but, worse, suspect that this may be a step "backward," or that it may "nurture capitalist economy."

In fact, these suspicions and worries are unfounded.

We all know that individual ownership economy is a single economic component: the laborer's private economy. It is neither capitalistic nor socialistic in nature. It has existed in every different type of social condition: for example, the industry and commerce operated by free persons in the slavery society; the individual money of the serfs in village and handicraft industry in the cities of feudal society; and the family labor, the individual farmer, and handicraftman of capitalist society. These have never taken an independent social form, but have always belonged to the prevailing economic system of the period. In the early days after the birth of this nation, a large volume of individual economy existed side-by-side with the national ownership economy and collective economy. Even at the high tide of socialist reconstruction in

1956, although a large number of individual industry and commerce units were converted into collective economy, there always existed a certain number of individual businesses. Before 1958, the individual economy occupied 2.8 percent of the national economy. Later, due to the influence of "leftist" inclinations, especially during the decade of upheaval, individual economy was chopped down and its numbers dropped abruptly. Nevertheless, the individual economy did not vanish completely. To be sure, when the socialist economy is fully developed, the individual economy will, in the end, be replaced by the collective ownership economy or the economy of ownership by the whole people. However, this can only be realized under circumstances in which the socialist economy and production power have developed fully.

Whether a certain form of economy system needs to exist or not should not be determined by the people's subjective desires. Rather, one must ask "whether it is compatible with the current stage of national production power." Before liberation, this country existed as a semicolonial, semifeudal society. Its production power was quite weak. After liberation, although significant progress has been made in matters related to socialist economic construction, there is still unbalanced development in various departments in various areas. There is not only modernized, automated, large-scale production, but also semimechanized, and semimanually operated production, and even manual labor production using only hand tools. A multilayered production system such as this requires production relations having corresponding multiple economic components in order to agree with the principle that production relations must correspond with the development of production power. In the past, due to our lack of understanding of the objective laws of socialist economy, although significant achievements were made in matters related to socialist reform of individual handicrafts, the pace was a little too fast. During the cooperativization movement of handicrafts carried out in 1956, in some areas several different handicrafts were grouped into a single cooperative. As a result, brands and variety of products are reduced in number and, worse, the quality of some name brands suffered a loss. In 1958, many handicraft cooperatives underwent further merger, reducing the number of brands and the variety of products even further. Craftsmen were no longer able, as in the past, to manufacture directly for the customer and repair their own products for the customer. Socialist reform of small stores and street vendors also encountered similar problems. When many cooperative stores and cooperative committees were grouped into state-operated commerce in 1958, those small stores and street vendors who were each fully responsible for their own profits or losses vanished almost completely. Many residents experienced extreme inconveniences as a result of this. Be it eating, buying groceries, or buying clothes, the lines were getting longer and longer. In view of what came to pass in this country after the socialist reform, it became clear that the existence and development of a small number of craftsmen and street vendors who are each fully responsible for their own profits and losses not only are tolerable but also are necessary in a socialist society in which the public ownership economy occupies the absolutely superior position. These individual enterprises can fill the gaps in the socialist public ownership economy.

It is evident from the above observation that tolerating the existence and development of individual economy to some extent means satisfying objective needs and is in complete agreement with objective economic principles. To be sure, during the process of socialist construction we must insist that development of whole people ownership economy and collective ownership economy be the first priority, and we must carry out step-by-step the socialist reform of individual handicraft and small street-vendor operations. However, this is not the same as eliminating in one morning all economic components other than whole people ownership and collective ownership economy, without any regard whatsoever for conditions or circumstances. For a very long time we have held some incorrect viewpoints concerning theoretical matters. The wrong viewpoint was manifested in the matter related to agreement between production power and production relations. We have onesidedly emphasized constant change in production relations in order to promote development of production power. On matters related to ownership, we emphasized only "big" and "public" and neglected concrete analysis. We held that ownership by the whole people was necessarily more advanced and superior than small collectives, and the collective economy was necessarily more advanced and superior than individual economy under any circumstance. Being guided by this viewpoint, standards for production power development were not met, and onesided emphasis on reform of the ownership system brought about endless "transition" and promotion. Many problems cropped up as a result of this method of operation. Practice has proven that premature and too hasty destruction of individual economy when various conditions are not yet quite ready is detrimental to the growth of production power and the socialist economy. Based on the experiences and lessons of the past and our own production power standards, and under the circumstances in which the socialist public ownership economy occupies absolute superiority, we have relaxed individual economic policy [restrictions] by allowing its existence and development within a certain fixed range. This does not mean that we are giving up the socialist road. On the contrary, this is being done to facilitate and promote the development of the socialist economy. We have gone too far too fast in the direction of eliminating individual economy, and a little "retreat" is absolutely necessary now. This "retreat" is, in fact, to promote "advance." This retreat is certainly going to stimulate even faster progress and development of socialist enterprises.

Could permitting the existence and development of individual economy lead to the rebirth of capitalism and the bouregeoisie? Did Lenin not say that small production is constantly, by day and by hour, automatically, and in large scale, producing capitalism and bourgeoisie? This statement made by Lenin must be analyzed in the light of the circumstances at that time. First of all, this statement by Lenin was made in 1920 before the collectivization of rural villages was carried out. The small production referred to in this statement was the scattered individual farmer economy which existed before the socialist reform was completed. At that time, the total volume of small production in a village occupied a dominating position. The individual farmers controlled 94 percent of the commodities and grains of the entire country. They were free to trade, to speculate and to fail, and exploiting components are bound to be born. Secondly, the capitalism and bourgeoisie referred to in Lenin's statement were mainly those farmers who engaged in grain speculation, and were not the capitalism which engaged in production by hired labor or the bourgeoisie which exploited hired labor. At that time, as a result of the devastation brought about by the war, food was scarce in Russia. In order to get grain and save the newly born Soviet Government, they implemented the mandatory collection of surplus grain. But some of the farmers were more interested in speculative activities in order to sell the grain at higher prices. It was these very activities which were labeled by Lenin "capitalist and bourgeois." The situation in this country today is quite different from that of the October Revolution. In this country, collectivization has long been realized and all farmers are commune members now. Vital agricultural products such as grain are mainly under the control of the collective economy, and the individual farmers can never speculate and trade in large quantities of grain. The individual small handicraft, small store, and small street vendor in cities and towns, according to production data, are small and private, and their services are aimed mainly at the socialist workers. Their raw materials are mainly supplied by the socialist enterprises. Their prices are in general regulated by the managing organization. Part of their profit is returned to the nation in the form of taxes. Their entire economic activities are directly or indirectly affected and controlled by the public ownership economy. They are subordinate to the socialist economy and are in the service of socialism. Therefore, not only is the individual economy itself certainly not a capitalist economy, but also, given the economic conditions of this nation today, it can never turn into capitalism.

The discussion of whether or not individual economy can develop into capitalism is often centered around whether or not a hired labor force is involved. To be sure, free trading of the labor force is one of the vital ingredients of shaping capitalism. However, it is wrong to say, conversely, that any activity in which hired labor is involved, no matter how much, is capitalist. Historically, hired labor existed from very early days. It coexisted with slavery for many centuries. Viewed from the practical side, it is also quite clear that hired labor does not automatically mean capitalism. Yugoslavia has a written law stating that small factories may hire from three to five workers. They have practiced this system many decades without regenerating capitalism or a bourgeoisie.

In Volume 1, Chapter 9 of "Das Kapital," Marx described surplus value rate and surplus value volume. He made a detailed study concerning the number of labor forces required for a currency-holding small boss to change into a capitalist. Marx reasoned that if a laborer is in possession of his own production materials and is also willing to live the life of a laborer, he needs only spend just enough labor each day to regenerate his livelihood materials. If 8 hours are required to regenerate his livelihood materials, then he works 8 hours a day. If he is hired by a capitalist, in addition to the 8 hours of labor needed to produce his own livelihood, he must work 4 hours to produce surplus value for the capitalist. If this capitalist wants to live a life comparable to that of the laborer, he must hire two workers.

However, the objective of capitalist production is to make a profit and to increase his wealth, and not merely to live a life comparable to that of the worker. If he desires to live a life twice as good as that of the average worker and to turn one-half of the surplus value into capital in order to increase his capital continuously, then he must hire eight laborers. Marx said, "To be sure, he himself can also participate in the actual production process together with his hired hands. But if he does, he becomes something between a capitalist and a laborer; he is a small boss." ("Das Kapital," Vol 1, p 321) He is still not quite a capitalist. After capitalist production has achieved a certain degree of development, "it will require the capitalist to devote his entire time to become a capitalist, to increase his capital, and to occupy and control other people's labor and to trade in the products of these labors." (Ibid) The guild boss of medieval times was prevented from turning directly into a capitalist by the limitations on the number of employees he was allowed to hire. Today, with the growth of labor production rate, it may not be necessary for a small boss to hire eight laborers in order to be able to become a capitalist. But in any event, there still exists a minimum number.

It is evident that in a society in which public ownership occupies the absolutely superior position, the existence of individual economy and a certain degree of its development are quite tolerable. Furthermore, allowing a few individual industrialists and merchants to hire a few apprentices will certainly not lead to capitalism.

Of course, since individual economy is a small private ownership economy, a certain spontaneous inclination is unavoidable, producing some forms of negative action. In this area, stronger leadership and assistance will be needed, and appropriate measures must be taken to ensure that they will not deviate from the socialist path.

9113
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REASONS FOR DROP IN JIANGNAN COAL PRODUCTION REVIEWED

Beijing JINGJI GUANLI [ECONOMIC MANAGEMENT] in Chinese No 8, 15 Aug 80 pp 11-13

[Article by Du Zhenbiao [2629 2182 2871]: "Correctly Deal With the Problem of Loss Incurred by Local Coal Mines in Jiangnan"]

[Text] I.

During the 30 years since the founding of the nation, the seven provinces (regions) south of the Changjiang--Guangdong, Guangxi, Hunan, Hubei, Zhejiang, Fujian and Jiangxi--have implemented the policy of "walking on two legs" with help from the state. They have mobilized the enthusiasm for building mines at all levels, and the coal industry has developed rapidly. The original yield of coal in 1949 was 1,530,000 tons, this was raised to 68,480,000 tons in 1979, an increase of over 40 times. Of this, local coal mines (provincial, regional, county, commune and brigade coal mines) were the main force. In 1979, they produced 58,600,000 tons of coal, constituting 86 percent of the total yield of the seven provinces (regions).

At present, the seven provinces (regions) have already determined the geological storage of coal to be 8.8 billion tons. There are now 855 mines above the county level. Of these, 481 mines produce over 30,000 tons a year. Their design capacity is over 52,000,000 tons. The staff and workers number nearly 500,000. Scientific research, machinery repair and construction, design and construction have all developed correspondingly and a definite foundation for further exploration of the Jiangnan coal fields has been laid.

But, in the development of the local coal mines in the seven provinces (regions) in Jiangnan, many problems have accumulated. For example, last year, the four provinces (regions) of Guangdong, Guangxi, Hubei and Jiangxi produced 4,600,000 tons of coal less than the previous year. This year, according to statistics for the seven provinces (regions), 90 mines have already ceased production. These mines produced 1,280,000 tons of coal last year. There are some mines that suppressed production and limited production by 1,570,000 tons. There are also many which are planning to cease production. If the yield of these mines continues to shrink, increased pressure will be placed upon the unified distribution of mines, causing a chain reaction and directly affecting the development of the national economy of the Jiangnan area.

The main reasons that the production of local mines of the seven provinces (regions) of Jiangnan has dropped are: complex objective conditions, high cost of mining, and great losses of the coal mines. These mines mostly utilize scattered resources, the storage conditions of the coal layers are poor, variations are great, and there is definite difficulty in mining. At the beginning of the mining operations, indigenous methods were used, coal was mined at shallow parts, and the operation of the mine was used to still sustain simple reproduction of the mine. As the mines became deeper, more and more difficulties were encountered. According to surveys conducted in Hubei, the cost of mining 1 ton of coal from one layer deeper rises by 5 to 6 yuan. Thus necessary equipment that should have been added could not be added, construction work that should have been done could not be done, and coal was produced with anything available. There are also some mines that joined in production with simple facilities, their production system was incomplete, a comprehensive productive capability was not formed, and more and more problems accumulated. The outstanding problems faced by these mines at present are: One, an imbalance in exploration and digging. Calculations based on the lower limit of the demand for a balanced "three quantities" showed that 73 percent of the mines were out of balance, and digging exploration lagged behind by 820,000 meters. The second is simplicity of the equipment. Large alleys that were traveled by push carts still constituted 60 percent, and 91 percent of the mines still depended on human labor to load rocks after digging. Another 30 percent of the mines depended upon natural ventilation or had only one ventilation well. There are even a few mines that use the open fork switch for lights, violating the "mine safety regulations." The third is debts for living expenses. Up till now there are still workers of some mines who live in simple work tents. They have nowhere to go to take a bath after emerging from the mines. There are no mess halls where they can eat and their dependents cannot go to school. The problems have accumulated, and it is very difficult to sustain production. According to statistics, last year there were 378 mines that lost 160 million yuan, and average loss per ton of coal was 4 yuan.

This year, because of the rise in the prices for consumable materials and energy resources, such as wood beams for the mines, cement, electricity, and with the addition of wage adjustments for the workers and the issuance of compensation for living expenses, the cost will necessarily increase. According to estimates for Hunan, Jiangxi and Guangdong provinces, the average increase per ton of coal was between 2.6 yuan and 3 yuan. Therefore, this year's scope of loss will increase. The loss in monetary figures will also surpass that of last year.

Because of the loss of local mines, the more digging the more loss is incurred. Many places believe mining is a losing business and that it is better to beg for coal, and they do not want to spend a lot to dig for coal. Key coal producing counties are also thinking of their own needs and are unwilling to make financial investments, material investments, produce more and ship their coal to other places, therefore the enthusiasm for mining has been dampened. For example, some counties in Hunan's Lianyuan area have three mines, of which two are closed. Some counties have four mines, but only one is left. Therefore, the region's plan to ship 1,400,000 tons of coal to other localities this year has fallen through. It can thus be seen that how to deal with and handle the loss incurred by the local coal mines in Jiangnan is an important question that concerns the coal mining industry in our nation's Jiangnan region and the development of the national economy in that region.

II.

A comparison of the coal mines in the Jiangnan area and the coal mining bases in the Jiangbei area shows that the investment for exploitation is large, production costs are high, loss in mining is great, and relatively speaking, mining is not the region's strong point. Should these losing coal mines in Jiangnan be closed and should their needs be satisfied by shipping coal from the north to the south? No!

Jiangnan is the bastion of fish and rice. Its light industries and textile industries are developed. The potential for industrial and agricultural production is great. The good or poor supply of fuel directly affects the speed of development of the national economy of the locality. From 1975 to 1979, the amount of coal shipped from the north to the seven provinces (regions) in Jiangnan constituted only 19 percent of the actual amount of consumption. Last year when the shipping of coal constituted only 24 percent. To close all losing mines in the seven provinces (regions) in Jiangnan will result in a onefold or twofold increase in the amount of coal to be shipped from the north into the region, based on the lowest amount of consumption at present. Obviously, this is very difficult to achieve.

The losing coal mines of Jiangnan cannot be closed, and there are the four following reasons:

First, considering the conditions of transportation at present, the capacity for transporting coal on the two north-south trunk railway lines has already reached saturation. Shanxi is the major province in Jiangbei which has the potential for shipping coal to other places. To increase the amount of coal shipped from Shanxi to other places by onefold requires rebuilding of five railway lines, and at the same time it requires building a new north-south railway trunk line, including a bridge spanning Changjiang. In this way, the lowest estimated investment is 70 billion yuan. Even if such a huge amount of capital is provided, the construction time will be at least 10 years. It is obvious that remote solutions can hardly solve immediate problems. Also, regions far away from the railroads will encounter difficulty in short distance transportation and some remote mountain regions are inaccessible.

Second, in the utilization of resources, the storage conditions of coal resources in Jiangnan are poor, strips are small, the coal layer is thin, the content of ash is high, the quality of coal is secondary, unlike Shanxi which is "endowed with riches." But the distribution of coal in Jiangnan is wide, and this is suitable for opening small mines but not large mines. According to surveys of the 710 countries in the 7 provinces (regions) in Jiangnan, 325 counties have coal resources. Of these, 307 counties have already utilized local resources for mining. Multiple localities and a wide area of distribution greatly improved the planning of the coal industry. Local production and local utilization have promoted the development of power generation, chemical fertilizers, cement, silk reeling, and paper manufacturing industries, and the local national economy has been enlivened. If one only sees the high cost of exploring the resources of Jiangnan and does not consider planning, and abandons them and does not use them, then this view is unilateral. The problem should be considered in the light of a long-term energy policy. It is not right to pick the rich and abandon the poor within one mining area, and it is also not good to pick the rich and abandon the poor resources in entire areas of coal fields. In particular, the resources of regions lacking coal must never be lightly denied by comparing the advantages of "northern coal" to the shortcomings of the locality. This is because local production and local utilization are still much better than transporting coal into the region.

Third, from the point of view of comprehensive economic effects, generally speaking, the investment for construction and the production costs for mining in Jiangnan are higher than in Shanxi, Henan and Hebei. But transporting northern coal to the south requires traveling thousands of li, and the transportation costs are high and loss is great. Take Zhejiang as an example: Last year, each ton of coal shipped from Shanxi, Hebei, Henan and Anhui provinces to Hangzhou cost an average of 14 yuan, 3 percent was lost en route, equivalent to 0.65 yuan, and adding the price of coal, the cost of each ton of coal came to 36 yuan. This did not include the amount not included in the plan which had to be bartered with food, edible oil and meat. And a caravan had to be dispatched to transport these over short distances. Although the cost of local coal per ton was 25 yuan and the quality was one grade poorer, 1 and a half ton of local coal is equivalent to 1 ton of imported coal, and this is still feasible.

Most of the mining enterprises in Jiangnan suffer losses, but comprehensive accounting shows that it is worth it. For example, Zhejiang utilizes local coal, and compensation for the loss per ton of coal is 4.2 yuan. On the average, 50,000 tons of coal can create 100 million yuan of value of industrial production, providing a profit and tax revenue of 20 million yuan, while compensation for coal is only 210,000 yuan. Kaihua County developed and utilized local bone coal. Compensation for each ton of coal was 7 yuan. Using bone coal to fire lime, bricks and tiles and cement, creates 150 yuan per ton, providing a profit and tax revenue of 25 yuan. Again for example, the Foshan area of Guangdong used to burn 230,000 tons of sugar cane residue each year. After the region began its mining operation, compensation for each ton of coal was between 5 and 10 yuan, and coal replaced sugar cane as fuel, allowing the sugar cane residue to be used to manufacture paper, which created a production value of from 100 to 150 yuan. Making a small investment for a large gain is something that anyone would want to do with pleasure!

Fourth, from the point of view of changing the structure of civilian consumption of fuel, the Hiangnan area has a very dense population, and the people use fuel for living. Those living near mountain regions burn firewood. Those living in plains burn rice stalks. In the past, Jiangxi Province used mainly wood and charcoal as fuel. Now, of 85 counties throughout the province, 52 counties have gradually replaced wood with coal, with the good result of closing the mountains for forestation. After Dayo County of Hubei Province launched coal mining and the masses began to burn coal, 450,000 mu of rice stalks were returned to the fields for producing fertilizers, and the effect of fertilization was equivalent to 3,000 tons of nitrogen fertilizers.

The four points above fully show that the function of the coal mines in the Jiangnan area is great. Some localities at present depend upon the north to ship coal to the south, and the need still cannot be satisfied. Therefore, the principle of suiting measures to local circumstances must still be insisted upon to actively help develop the coal mines of some localities.

III.

To actively help develop the coal mines of Jiangnan, could the loss be entirely taken over by finances? No.

This type of method of "sharing the big pot" does not differentiate which is loss due to policy and which is loss due to operation, and it is unfavorable to mobilizing improvement of the coal mines and strengthening the enthusiasm of management and operations.

Zhejiang Province implemented compensation for loss due to policy, and the results were good. They conducted surveys and studies and started out from the actual situation. A compensation method was implemented to compensate for the exploration and utilization of bone coal which is needed by the locality, although the quality of the coal is poor and the digging rate per 10,000 tons is high. Each mine writes up a production plan at the beginning of the year and also submits a loss plan according to standards. The provincial coal bureau and financial bureau jointly review and determine the amount of compensation. The results are good. For example, in 1979, each mine planned a loss of 6,670,000 yuan, the approved compensation was 5,260,000 yuan. After implementation, the actual compensation was 4,700,000 yuan. The cost per ton of coal of the losing coal mines dropped from 17.2 yuan of the previous year to 14.3 yuan. This method is worthy of popularization.

To correctly deal with the loss of the local coal mines in Jiangnan, surveys and studies must be conscientiously conducted to analyze the causes of the loss on an overall basis and deal with the reasons separately.

All subjective causes such as managing a small mine in a big way, poor management or backward methods of mining must be rectified concretely, operations and management must be improved, mining methods must be improved, and a time limit must be placed on the mines to turn losses around and increase profits.

All objective conditions which cause losses and which are difficult to overcome, such as hydrological conditions and geological structures that are complex and cause a high mining rate per 10,000 tons, high drainage of water at the bottom of the mines, or secondary quality coal which is needed by the locality and has a market should be listed as loss due to policy and should be compensated for. The method of Zhejiang should be taken as reference to implement fixed amounts of compensation, planned control, refusal of compensation for overly large losses, and reduction of loss for self use. In this way, those losing coal mines can continue to operate, and also the strengthening and improvement of operation and management of the coal mines can be stimulated. Some places have suited measures to local circumstances and implemented a way of operation in which the mine leads the plant in joint operation, and losses incurred by the mine are compensated by the plant. This is also very effective.

Of course, those mines which are extremely poor economically and technologically should either be combined or should be closed when necessary. But, in carrying out this work, the advantages and disadvantages must be measured and balanced on an overall basis, and care must be used in dealing with the situation. Actions must not be taken "in one blow" and "in one swift action."

9296
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BRIEFS

HEILONGJIANG'S QIQIHAR MUNICIPAL REVENUE--In the first 7 months of 1980, the total financial revenue of Qiqihar Municipality, Heilongjiang, was 84.08 million yuan, which amounted to 62.6 percent of its annual revenue plan this was 30.6 percent higher than in the corresponding 1979 period. It is estimated that Qiqihar will overfulfill its annual revenue plan. [Harbin Heilongjiang Provincial Service in Mandarin 2200 GMT 14 Oct 80 SK]

CSO: 4006

XIZANG DEVELOPS GEOTHERMAL ENERGY

Beijing JIEFANGJUN HUABAO [LIBERATION ARMY PICTORIAL] in Chinese No 10, Oct 80 p 2

[Excerpt] At the edge of the foothills of Mt Nyainqentanglha, which is snow covered year-round, and approximately 90 kilometers northwest of the city of Lhasa, is the broad and flat expanse of the Yangbajain Basin. In the middle of the basin is the famous Yangbajain thermal field.

Legend has it that long, long ago the mist would spread out like a vast expanse of gossamer every morning over the broad hot-water lake in the eastern part of the thermal field. At this time, the beautiful wives and daughters of the god of Mt Nyainqentanglha would come to the lake to bathe. It was also said that the god of the mountain had a golden lantern, and if he was happy he would hang it high over the lake, so the light from the lantern would illuminate the lake, the thermal field, and the snowy mountain, whereupon Yangbajain would be transformed into an earthly paradise, with fresh flowers blooming everywhere and myriad birds singing in chorus. However, in the eternal dark age that was ancient Xizang, the god of the mountain was never happy, and the herdsmen of the Yangbajain Basin were forever bemoaning their bitter lot.

In 1951, Xizang's history turned over a new page. The party Central Committee sent a geological survey team along with the advancing PLA. Led and motivated by China's eminent geologist Li Siguang, the geological workers carried out a number of extensive scientific surveys of the Yangbajain thermal field. In March of 1975, the first thermal well on the Chinese mainland was completed here. Surveys have shown that the natural flow of Yangbajain is 107,300 kilocalories/second, and the heat emitted every year is equivalent to burning 470,000 tons of standard coal. In addition to power generation, this geothermal energy can be widely used in industry, agricultural sidelines, and in the people's lives. In September of 1975, Comrade Hua Guofeng led a Central Committee delegation to Xizang, and gave instructions to "complete the Yangbajain geothermal power station as quickly as possible." Group after group of Chinese and Tibetan technical personnel and workers came here from Beijing, Qingdao, Sichuan, and various places in Xizang, and dozens of retired PLA soldiers volunteered to come to Yangbajain. They cooperated closely and strived selflessly for the early completion of the geothermal power station.

The thousand-year-old myth has finally become a reality. In October of 1977, a trial geothermal power station with an installed capacity of 1 million watts was completed and went into operation. The "golden lantern" that people had dreamed of was finally hanging over the thermal field.

CSO: 4006

ENERGY

BRIEFS

JILIN POWER OUTPUT--Compared with the corresponding 1979 period, Jilin Province increased its power output by 989 million kwh in the first 9 months of 1980. [Changchun Jilin Provincial Service in Mandarin 1100 GMT 10 Oct 80 SK]

CSO: 4006

INDUSTRY

BALANCE BETWEEN SELF-RELIANCE, FOREIGN BORROWING VITAL

Shanghai CHUANBO GONGCHENG [SHIP ENGINEERING] in Chinese No 3, 1 May 80 pp 5-7

[Article by Shen Yurui (3088 1471 3843): "Self-Reliance and Introduction of Technology in the Work of Developing Power for Ships"]

[Text] After liberation, our nation's shipbuilding industry achieved great development under the care of the party and government. The ability to build ship hulls and facilities for the scientific study of ship's hulls were grasped earlier and have some foundation, but the development of power for ships has always lagged behind the needs of the situation. This situation exists in common in the aviation industry, the automobile industry, and other transportation industries. As people have often said, these industries suffer from "heart disease." There are many reasons why such a phenomenon has occurred. The main reason, of course, is due to the interference of the mistaken policy line, but it cannot be denied that there has been a lack of forceful measures and relatively uniform recognition in developing the power industry and other scientific research in actual work. For the past more than 30 years since the war, man has entered an era in which science and technology have developed in leaps, and power machinery has been no exception. New types of high-power military and transport machinery have emerged continuously. Old types have been renovated over several generations. All of these have been realized abroad on the basis of a systematic, socialized, and strong and forceful exploration and development of scientific research and technology. Our nation's power industry for ships began during its early stage of development by copying Soviet models. This was entirely necessary. But during the same period of copying, a complete system for establishing our nation's own basic scientific research and research for the development of products was neglected. Thus for a long time the industry copied and no improvements were made. Scientific research work also lacked forceful measures. Progress was slow. Basic research was scarcely carried out at all. In particular, Lin Biao and the "gang of four" seriously sabotaged our nation's scientific and technological efforts at the key moment. Leadership of scientific and research work was controlled by some seemingly true but actually false "theories." The relationship between scientific research and production was confused and chaotic, and therefore a normal productive relationship beneficial to the development of science, technology, and production has not yet been formed. For the past 20 to 30 years, foreign nations have advanced from effective basic scientific research to the research and development of industrial products, even attaining a whole set of experiences in mass production. Because of the xenophobic ideology of the "gang of four," very few people conscientiously studied and analyzed these. The building of scientific research facilities and bases for the research and development of new industrial products in our nation's power industry for ships has always lacked an overall plan. Scientific research work for plans which could have been implemented according to the actual situation lacked unified leadership, the forces were scattered, and the "punch" could not be formed. This is an important reason why motive power for ships is still backward.

Introducing technology is an important policy of economic technology. At the beginning of the founding of the nation, introduction of technology by copying the Soviet Union was done on a large scale. But for a long period, imperialism locked us out from technology; as long as the technology had anything at all to do with the military, it was not allowed to be exported. The Soviet Union betrayed its promises and tore up its own contracts and were expert at withdrawing. Faced with this kind of historical situation, the people of our nation answered the call by the party, drummed up their working spirit, strived forward, became self-reliant, struggled to become strong, established ambitions, set goals, tried to surpass the world's advanced levels, and carried out research and design work in all aspects, based upon the principles of "being independent, being one's own master, being self-reliant, and relying on one's strength." Even though there was little experience and conditions were poor, the speed of the development of technology from the pioneering sciences to the ordinary sciences was unprecedented. Without the serious sabotage by Lin Biao and the "gang of four," achievements would have been even greater. During this period, the method of carrying out research and development in a self-reliant manner was correct. Now, many scientific and technical personnel look back at the mid-1960's and see that our nation's science and technology developed prosperously. Scientific and technical personnel were enthusiastic and worked day and night continuously. All of them remember this scene vividly. During that time they conscientiously and enthusiastically studied any foreign materials they could obtain, and they tried every way to apply the learned information in their own research and design.

After the mid-1960's the "gang of four," trying to realize its goal of usurping the party and seizing power, illegally used the pretense of "independence, being one's own master, self-reliance, and relying on one's own strength" to carry out the reactionary policy of "parochial arrogance and closing the country to international intercourse." The accusation of "slavish comprador philosophy" was used indiscriminantly. This kind of reverse activity had nothing in common with the policy, advocated by Comrade Mao Zedong, of "being independent, being one's own master, being self-reliant, and relying on one's own strength." On the contrary, for the past decade and more, the "gang of four" caused the system in industry and in scientific research work to become lax. Quality dropped, seriously damaging the reputation of research and designs realized by ourselves. In addition, the "gang of four" authorized "rules of dictatorial rule," preventing the nation from drawing up a unified plan and setting up leadership for the development of industrial products, thereby causing forces to disperse and creating a confusion of models of machinery; "research and development" frequently sought quick success, and basic research was neglected, resulting in haste makes waste. These negative experiences have caused some comrades today to totally negate previous achievements. They regard the introduction of technology as a measure to "correct" these mistaken inclinations. They place the introduction of technology up against their own research and development, and neglect to conscientiously summarize the experience and lessons of the previous period for facilitating a comeback.

Introduction of technology is like everything else--it is two-sided. It is in opposition to the policy of "self-reliance and relying on one's own strength," but it is also in unity with that principle. Introducing advanced technology means hastening "self-reliance," so that industrial investments can develop their functions quicker and our own research and design work can begin from a more advanced basis. Especially after the introduction of technology, machinery that we have developed by ourselves must take the world's advanced level as the goal of research and development; otherwise the machinery will not survive in the international market. This serves the important function of stimulation. But if this is not handled properly, the wide effects due to the introduction of technology will hinder "self-reliance". According to Japan's experience and to the comments on the road Japan has followed, the main side effect of the introduction of technology is that management and technical personnel easily come to depend upon foreign nations and even adopt the attitude of blindly believing in foreign nations, thus weakening the efforts of the nation itself to be creative. Imitation takes up too much of the forces of production and technology and takes away a forceful support for developing the nation's own technology. This easily causes a neglect of basic research and prerequisite research, and industrial technology cannot free itself from the old path of foreign technological development. These side effects did occur during the beginning period of our nation's industrial development. Therefore it is hoped that, when we arrange the relationship between the introduction of technology and our own research and design, these side effects will be avoided.

The introduction of technology also involves political factors, because when making deals with technologically advanced capitalist nations, there is nothing that is not related to politics and to economic benefits. Technologically advanced nations will never willingly let us surpass them. They are also progressing and are progressing on a foundation that is much stronger than ours. If we abandon efforts to strengthen our nation's own scientific research and industrial foundations, if we do not dare to be creative in technology, if we do not walk our own road of technological development, the gap will become greater and greater. By buying patent rights, we can introduce only those products that have already become commercial items on the international market. These products are generally the results of 5 to 10 years of research and development, and the research and development procedures are generally "commercial secrets" that do not accompany the patent diagrams and documents. Products of the next generation which are being researched and developed are even more tightly guarded secrets. Even in the capitalist world, those countries that are politically and economically very close allies still scheme against each other in the introduction of technology. Each wants to use the other and also wants to prevent the other from surpassing it and wants to stay in the lead. During the beginning of the 1960's, Japanese technical journals frequently published many articles criticizing Japan's simplistic dependence upon the introduction of foreign technology since the Meiji Reformation and its neglect in developing the nation's own scientific research. After the mid-1960's, Japan greatly strengthened the investment and the forces in domestic research and development work. In recent years, the latecomer has taken the lead in some scientific and technological fields. This is not by chance. But even so, Japanese scientific and technological circles still believe: "To judge the level of technology of a nation, one must not only look at what kinds of technology it has and uses, but more important what processes it uses to grasp this kind of technolog.. A high level of technology can be reached only by developing unique and creative technologies on a firm and solid scientific foundation." As our nation learns the experience of Japan's efforts to import technology, we must also take their lesson as a warning. We must establish in time a complete system of our own nation's scientific research and development of products and strengthen our nation's own "independent and autonomous" research and development work.

From the point of view of training talent, those who can truly think independently according to the actual situation, and those who can create and invent, must depend mainly upon working on their own research and design. The experience of foreign nations must be learned. This is one thing. But there is another thing, which is to check other people's experience in one's own experience, to take in the things that are useful but reject those that are not useful, and to increase the things one owns. The conclusions concerning war reached by Comrade Mao Zedong are entirely applicable to scientific and technological work. Imitation of design introduced from foreign countries in industrial production must emphasize true imitation. At first, everything should be done accordingly; otherwise, production will not have any order, and the more changes the product undergoes, the more chaotic will the situation become. But scientific research work must not be complete copying. Independent thinking must be promoted. Even in digesting information introduced from abroad, the work must be selective; it is unnecessary to carry out exactly the same research. In developing our nation's own models, it is not necessary to follow the old path traveled by others already in structure. Although the diesel engine is a kind of relatively mature machinery product, in recent years a new trend in its development has emerged because of the inundation of the combustion and rotary engines. Yet development of the combustion and rotary engines is still alive. Also, in the development of oceanic work, the closed-cycle heat engine also has a broad future for development. As long as we liberate our ideology, enliven our spirit, shake off blind beliefs and the sense of relying on others, develop the glorious spirit of revolutionary creation of our nation's people, and develop the spirit of hard work in actual work and the scientific spirit of seeking truth from facts, there will be a bright future.

The development of any kind of new technology must undergo a process of growth from imperfection to perfection. As technology develops, it again progresses from perfection to imperfection. Research and development of new industrial products must be continually researched and improved. After relative perfection has been reached, the model of the product is fixed and the product enters into industrial production. But after the form has been established, research for the next generation of products continues without stop. Thus the product is continuously renovated and substituted. Only in this way can products suit the present world trend. Replacement of military products goes on even faster. According to U.S. statistics, the average life of a product is 2 to 5 years. Therefore, depending on foreign nations for research into and development of military products is very dangerous. This does not mean that learning from foreign nations is not needed for producing military products. At any time, foreign nations will have something better than what we have, but learning is one thing, and tightly grasping the initiative in technological development is another thing. Otherwise, when international exchange ceases, technological development will suddenly cease. The lesson of Japan in World War II should be taken as a warning.

At present, development of research and design work on our own is still difficult because of the lack of an organized system favorable to the rapid implementation of scientific and technological development and new technologies in industry and a unified recognition. Since the national science conference, the state has obtained a clear view in theory concerning the question of basic theoretical research and the opening up of new technological fields, by criticizing the "gang of four." Also, a long-term plan for the development of basic and technological sciences has been drawn up. This is a welcome phenomenon. But ideological recognition concerning the question of research and development of ordinary industrial products is still not consistent. At present, the international situation is favorable to the introduction of technology, and those technologies which truly are urgently needed in our nation should be introduced into our nation as much as possible (it is more important to introduce into our nation the advanced technologies and methods of scientific management of foreign nations than to introduce product designs into our nation). The work of introducing technology must be done better, so as to call upon scientific and technical personnel to exert efforts to grasp advanced technology. But at the same time, this favorable situation must be utilized in order to hasten the establishment of our nation's scientific research facilities for our own independent research and development and of industrial bases of scientific research, and to train a Red and expert team. The technological capabilities of this team must be capable of independent thinking and continued development of new equipment according to the actual needs of war when, during time of war, international technological exchange is cut off. This question, it seems, still needs to be solved.

9296
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INDUSTRY

TITANIUM ALLOY HYDROFOIL PROVES SUPERIOR TO STEEL

Shanghai CHUANBO GONGCHENG [SHIP ENGINEERING] in Chinese No 3, 1 May 80 pp 17-23

[Article by Yu Tong (0060 1749) and Wang Chunmao (3769 2797 2021): "Titanium Alloy Hydrofoil"]

[Text] I. Foreword

Titanium alloy has a low specific gravity, a high specific strength, good resistance against erosion by seawater, is easily welded, and is a superior type of structural material for ships. Our nation has very rich reserves of titanium. This has provided favorable conditions for the application and development of titanium alloy. To utilize this new material in the shipbuilding industry, we have selected the titanium alloy hydrofoil as a typical product for research and development to solve the problems in titanium alloy processing technology. We have also examined its superior properties and shortcomings in actual application in the ocean.

The working environment of the hydrofoil of a hydrofoil craft is harsh. Thus, the demands upon the properties of the materials are higher, the materials are complex in structure, and processing is relatively more difficult. Therefore, through the construction and the use of titanium alloy hydrofoil, a correct evaluation can be obtained to determine whether or not titanium alloy can be used in the shipbuilding industry.

The titanium alloy hydrofoil was successfully developed in 1969 with the help of concerned research and design institutes and the Hudong Shipyard. After 10 years of actual use of the vessel, the results have been good and the predetermined goal has been reached.

II. Properties of Materials for Hydrofoil

Different brands of titanium alloys have vastly different strengths. According to the demands upon the properties of hydrofoil materials, we selected the alpha single-phase TA5 alloy of medium-strength titanium alloy for the conducting of experiments and for trial use on an actual vessel.

1. Dynamic Properties

The actual measured values of the dynamic properties of the TA5 titanium alloy and the dynamic properties of the TC4 titanium alloy of higher strength have been compared.

In the construction of the hydrofoil, TA5 titanium alloy panels 14 and 40 millimeters thick and forgings of a wall thickness of 50 millimeters were used. The hot-rolling temperature of the 14-millimeter panel is relatively low (about 930°C). After annealing, the panel has an isometric crystalline structure with good plasticity. The hot-rolling temperature for the 40-millimeter panel is higher (about 1100°C). It is not annealed. It has a coarse, acicular structure with remnant crystalline border, or a sawtooth type of structure. Its plasticity is relatively low. Consideration was given to the fact that hydrofoil materials do not require high plasticity, and therefore hot-rolled panels were used.

The specific gravity of the TA5 titanium alloy is 4.43 g/cm^3, and its specific strength is about 13.9 kg/mm^2/g/cm^3--1.7 times the specific strength of 0.22 steel (8.15 kg/mm^2/g/cm^3).

The weakness of the TA5 titanium alloy is that it has a relatively low modulus of elasticity E.

2. Property of Corrosion

(1) Stationary seawater corrosion

The resistance of 922 steel to corrosion by seawater is very poor. A 3-year sample waterline test showed an average rate of corrosion of 0.17 mm/year. The anticorrosion of the TA5 titanium alloy is very good. It basically did not corrode in 3 years.

(2) Destruction due to submergence of empty vessel

The experiment of destruction due to submergence of the empty vessel was performed on the rotary plate and magnetostriction testing equipment. The medium for the experiment was natural seawater.

The resistance of TA5 to destruction due to submergence of the empty vessel is superior to that of 921 and 922 steel.

(3) Erosive corrosion from seawater

The anticorrosion quality of TA5 in seawater at high speeds is very good. Natural seawater flowing at a velocity of 8.5 (meters/second) parallel to the surface of the test sample in an erosion test for 30 days did not cause any corrosion. The average speed of corrosion over a 148-day period was 0.00016 (millimeters/year). Natural seawater flowing at a velocity of 13.5 (meters/second) perpendicular to the surface of the test sample in an erosion test for 116 hours did not visibly affect the surface.

(4) Contact corrosion

The electrolytic electric potential of TA5 in contact with saturated mercurous chloride electrode in natural sea water is +0.09 volt, higher than other metals. But because titanium polarizes very easily in seawater, the electric potential quickly drops from a higher value to the level of ordinary carbon steel. Therefore, the electric current of corrosion produced by contact between titanium alloy and other metals is not great, and accelerated corrosion is not strong. The results of laboratory tests of contact corrosion show the effects of TA5 titanium alloy and 922 steel upon Д16AT aluminum alloy and 902 steel are similar.

(5) Clinging sea life and corrosion

Titanium alloy does not have the ability to prevent tarnish by such sea life as bryophytes, spiral shells, balanus amphitrite, oysters, calcareous sea creatures, and hydra. Sea life clining to titanium alloy can be removed more easily than from steel. The surface of the titanium alloy after removal of sea life which had clung to it for 5 years was still shiny, and there was no trace of corrosion or clinging.

3. Toughness Against Breaking, and Speed of Expansion of Cracks

The value of the stress factor of K_{1c} measures from a test sample of a bent piece of TA5 titanium alloy with three supporting points was 310 kg x $mm^{-3/2}$. The value of the stress factor of K_{1scc} in 20°C of natural seawater measures by the suspended stress and corrosion testing instrument was 230 kg x $mm^{-3/2}$. The speed of expansion da/dN of cracks of the test sample of a bent piece of TA5 titanium alloy with three supporting points was measured by the flexibility method on the vibration and fatigue test instrument. The increment ΔK of the stress factors is between 20 and 250 kg x $mm^{-3/2}$. The speed of expansion of cracks is divided into two sections:

The first stage

Upper limit: $da/dN = 1.79 \times 10^{-14}\ \Delta K^{5.95}$ (mm/cycle)

Lower limit: $da/dN = 2.65 \times 10^{-14}\ \Delta K^{5.95}$ (mm/cycle)

The second stage

Upper limit: $da/dN = 2.16 \times 10^{-9}\ \Delta K^{2.87}$ (mm/cycle)

Lower limit: $da/dN = 0.86 \times 10^{-9}\ \Delta K^{2.87}$ (mm/cycle)

If $da/dN = 10^{-7}$ (mm/cycle) is taken as zero expansion, then the critical strength factor of fatigue or the threshold value ΔK_{tn} is about 14 to 19 (kg x $mm^{-3/2}$).

4. Properties of Fatigue

The TA5 titanium alloy was subjected to high-cycle and low-cycle fatigue tests.

High-cycle rotation and alternate bending fatigue test: The corrosive medium was natural seawater (shower); the number of cycles was 10^7 times. The σ_{-1} of 922 steel was about 13 (kg/mm^2); the σ_{-1} of TA5 was about 26 (kg/mm^2).

Low-cycle fatigue test: The stress cycle frequency was 120 times/minute, rotating asymmetrically and in one direction. When the fatigue stress is 0.8 $\sigma_{0.2}$, the lifespan is 3×10^4 rotations; when the fatigue stress is 0.5 $\sigma_{0.2}$, the lifespan is greater than 30×10^4 rotations.

III. Processing Properties of TA5 Titanium Alloy

1. Machine Processing

The hardness of TA5 titanium alloy (H_b) is 220 to 260, and the alloy has good properties for processing. Using hard alloys or high-speed steel knives and cutting equipment, and with an appropriate cutting speed and cutting amount, the TA5 alloy can be easily lathed, milled, planed, drilled, broached, and cut.

A pneumatic grinding wheel and an ordinary grinder can grind TA5 alloy. It can be cut by a high-speed steel saber especially treated by pure fire--tempering process or a pneumatic milling cutter fitted with a hard alloy blade.

2. Cold Straightening and Hot Straightening

The TA5 titanium alloy can be cold-straightened. Its resilience is greater than that of structural steel.

When the TA5 titanium alloy panel in the annealing state is heated by an oxygen-acetylene flame to 1000°C and then cooled, the isometric crystalline structure is changed to an acicular structure. This does not greatly affect the properties of the panel. When the TA5 titanium alloy panel in the hot-rolling state is heated by the oxygen-acetylene flame to 1000°C and then cooled, the structure of the panel and the properties do not visibly change. Therefore, the TA5 titanium alloy can be hot-straightened. But when the titanium alloy is heated to a higher temperature, the crystalline border and the inner part of the crystals oxidize. Thus, the heating time should be shortened as much as possible.

3. Flame Cutting

Titanium alloy can be easily cut by an oxygen-acetylene flame, and a clean cut can be obtained. The width of the region affected by heat: 5 mm on the upper surface near the flame; 1 to 2 mm at other places; about 5 mm at the cut.

4. Welding

Titanium alloy under high temperatures (>600°C), and especially in a melted state, reacts very easily with oxygen, nitrogen, and hydrogen in the air. Its properties thus worsen. Therefore, welding must be done under the protection fo inert gases. The TA5 titanium alloy has good properties for welding. It can be argon-welded by hand and can also be automatically arc-welded with tungsten electrodes and melting electrodes.

Because the linear energy of automatic welding is much greater than that of hand welding, a protective shield should be placed behind the mouthpiece to prevent oxidation of the welded seam. The back of the welded seam should be reliably protected by an inert gas to assure the high quality of the welded seam.

Because the titanium alloy has a small specific heat, its heat conduction is poor. To prevent high-temperature oxidation, overheating, and enlargement of crystals at the welded seam and in the region affected by heat, welding techniques with small linear energy parameters should be used as much as possible.

The welding of the TA5 titanium alloy hydrofoil used the TA4 titanium alloy filament for soldering. The strength of the welded seam was equal to the alloy body. In the tensile test of the seam, the sample broke off but the welded part remained intact. The metal used to solder the seam was acicular alpha prime in structure. Results of the rigid butt cracking resistance test were good, and cracking did not occur.

IV. Assembly--Welding of Titanium Alloy Hydrofoil

The plan to assemble-weld the auxiliary hydrofoil of titanium alloy at the bow and the tire fixtures is the same as when constructing with steel, but welding must follow manual argon arc-welding procedures.

Welding of the main hydrofoil was done by the Hudong Shipyard using two methods. According to past experience, after the welding, the two tips of the hydrofoil bend upward. Because deformation of titanium alloy panels due to welding is more serious than in the case of steel, and because part of the horizontal wings of the titanium alloy hydrofoil has been changed to a hollow structure (while steel hydrofoil is solid), deformation is very hard to correct. To reduce as much as possible the deformation of titanium alloy hydrofoil due to welding, an assembly-welding plan was used. The hollow horizontal wing is connected by three supports at three joints. The advantage of this plan is that the original asymmetrical fillet-welded seam is changed to an upper and lower symmetrical butt-welded seam (symmetrical horizontal wings) and a left and right symmetrical butt-welded seam (symmetrical supports). In the welding process, the upward and downward and left and right deformations of the hydrofoil and the supports can be controlled or corrected by welding lines, thus reducing the possibility of deformation. The tire frame is of rotary design to avoid overhead welding and to assure welding quality.

In the general assembly and welding of the main hydrofoil, all parts should be pressed down tightly by pressure plates for a fixed rigidity to reduce deformation. Because the horizontal wing of the main hydrofoil is a variable cross-section and is hollow in structure, differences in thickness at different places are vast, and therefore welding techniques of different parameters must be used for different places. At thin cross-sections, thin filaments and a small current must be used, and at thick places, thick filaments and a large current must be used.

After all parts have been welded, the deformation at all places must be measured. The results show that the distance between side supports is 6 to 11 millimeters greater than the standard values. The distances between the central support and the plane of the central line of the vessel in the front and in the back are 3 millimeters and 0.5 millimeters respectively. The greatest deviation (unevenness) between the pressure plane of the horizontal wing and the base level plane is 4 millimeters. All of these are within the margin of error allowed and satisfy the specification demands. The deviation of the solid horizontal wing on the left is 4.5 millimeters, greater than the specified allowable deviation of 4 millimeters, but the area is not large and there is not much overage. This can be adjusted during installation, and it will not affect use.

The shape and dimensions of the titanium alloy completely satisfy the original standard specifications for the steel hydrofoil. The weight of the titanium hydrofoil is comparable to that of the steel hydrofoil.

V. Test Run and Use of Titanium Alloy Hydrofoil

The titanium alloy hydrofoil was installed on a vessel for testing in November 1969.

Before the titanium alloy hydrofoil was installed in place of the original, the hydrofoil craft underwent a velocity test in a stationary body of water. After the titanium alloy hydrofoil was installed, the craft not only underwent a velocity test in stationary water but also underwent three navigational suitability tests. Turbulence of the sea at the time of the tests was from 3 to 4 on the turbulence scale. During the second navigational test, the surge of waves was long and great. The craft frequently lifted into the air and flew through the waves. Under heavy slapping by the waves, the craft shook violently and the titanium hydrofoil underwent a severe test. In the third navigational test, the waves registered only 3 on the scale. Even when the craft traveled at top speed, slapping against the craft was not as heavy as during the second test. The hydrofoil seldom lifted from the water. The auxiliary hydrofoil at the bow was frequently above water. Passengers in the craft did not feel too bad.

The craft was inspected at regular intervals. The surface of the titanium hydrofoil was shiny, and there were no traces of any corrosion. The welded seam was intact; only a slight crack was found in the welded seam at the tip of the wing. The crack was removed by a file, and the craft continued its navigational test.

VI. Conclusion

Up to the present, titanium alloy hydrofoil has been in actual use on vessels for 10 years, with about 730 hours of navigation. According to our examination, the characteristics of titanium alloy can be summarized as follows:

1. Titanium alloy is strong and hard, and it is not easily damaged or deformed. In particular, when it is in motion and comes into contact with foreign objects, it shows its superiority even more. For example, the test craft once made a forced beach landing. The craft was inspected after the incident, and the titanium hydrofoil was completely undamaged. Another steel hydrofoil craft made a forced beach landing, and the steel hydrofoil was partially damaged and deformed.

2. Installation of the titanium hydrofoil in place of the steel [hydrofoil] lessened the weight of the craft and raised the navigational speed by about 4 knots.

3. Titanium alloy tolerates corrosion well. After 10 years of use of the titanium hydrofoil, the surface was still shiny as before, and there were no traces of corrosion or erosion due to submergence of the empty vessel. The scales on the surface of the welded seam could still be clearly recognized. The shape of the titanium hydrofoil did not show any visible change. On the other hand, steel hydrofoil corroded severely, and the surface was dented and uneven. Especially serious was the fact that the support bracked had rusted away and its original shape could not be recognized.

4. Maintenance and care of the titanium hydrofoil are simple. The titanium alloy does not prevent tarnish. To prevent sea life from clinging, a preventive coating of paint must be applied to the surface. Even if a coat of paint is not applied to counter tarnish, sea life clinging to the body can be removed relatively easily, because the titanium alloy basically does not corrode and the surface remains shiny and even.

5. Titanium alloy has a relatively small modulus of elasticity, about half that of steel. The main hydrofoil has already been changed to a hollow structure, so the rigidity index of the titanium hydrofoil is much smaller than that of the steel hydrofoil. But in practice, no visible deformation has been discovered. On vessels equipped with different hydrofoils, the crew members feel almost the same.

6. Slight cracks have occurred at the welded seams of the titanium hydrofoil. These cracks were not at the places under the greatest pressure but were at the tip of the joint between the side support and the supporting bracket. This place is very thin, is on the rim, and is not easily protected during welding. The metal used in the welded seam became brittle due to oxidation. When the crack was repaired, the place at the tip and the transient circular arc were appropriately thickened, thus eliminating the crack. To prevent the occurrence of cracks in the future, protective measures must be strengthened when welding this type of thin cross-section on the rim. At the same time, the design should be improved to make the structure even more rational.

7. The laboratory experiment for contact corrosion shows that the accelerated corrosion of TA5 and 922 steel upon aluminum alloy and 902 steel is the same. Actual navigational tests show the accelerated corrosion of TA5 titanium alloy upon pure aluminum is greater than 922 steel. The pure aluminum bearing plate between the bracket plate of the support of the titanium alloy hydrofoil and the body of the craft corroded very seriously, while the bearing plate of the steel hydrofoil corroded less seriously. Therefore, attention should be paid to the insulation between the pure aluminum contact surface and the titanium alloy.

In summary, the development and manufacture of the titanium alloy hydrofoil have been successful and satisfactory. Titanium alloy used to manufacture hydrofoil has more advantages than does structural steel. In particular, the superiority of titanium alloy is more apparent when it is used to construct deeply submerged hydrofoils and hydrofoils of such craft with large displacement.

9296
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BRIEFS

TV SET PRICE REDUCTION--Effective 7 October 1980, the "unified" prices of black and white and color television sets manufactured in China will be lowered in Shandong Province. The price of a 16-inch B&W television set fitted with Chinese-made tubes will be reduced from 721 to 567 yuan, and the price of a B&W 19-inch TV set will be reduced from 824 to 649 yuan. The price of a 19-inch TV set with imported tubes will be lowered from 876 to 690 yuan, and the price of a 20-inch color TV set with imported tubes will be lowered from 2,470 to 2,060 yuan. [Jinan DAZHONG RIBAO in Chinese 15 Oct 80 p 1]

GUANGDONG INDUSTRIAL DEVELOPMENT--The total value of Guangdong's industrial output now is 32 times greater than in 1949. The number of counties and municipalities with an annual total industrial output value of more than 100 million yuan is 29, including: Guangzhou, Shaoguan, Foshan, Jiangmen, Shantou, Zhanjiang, Maoming, Haikou, Zhaoqing and Chaozhou municipalities and Panyu, Chaoan, Chaoyang, Jieyang, Lufeng, Meixian, Xingning, Dongguan, Zongshan, Shunde, Xinhui, Nanhai, Taishan, Kaiping, Lechang, Yingde, Qujiang, Yangjiang and Yangchun counties. The number of townships with a total industrial output value of over 100 million yuan is 5. In 1949, there was no county or municipality except Guangzhou whose total industrial output value exceeded 100 million yuan. However, the total value of Shantou Municipality's industrial output alone is now equal to the total sum of the whole province's industrial output value in 1949. [Guangzhou Guangdong Provincial Service in Mandarin 2345 GMT 2 Oct 80 HK]

ANHUI COMMODITY CIRCULATION--In his report to the Fifth Meeting of the Standing Committee of the Fifth Anhui Provincial CPPCC Committee on 20 October, (Li Jixiang), deputy director of the Anhui Provincial Financial and Trade Office, said that an urgent task for Anhui now was to improve commodity circulation so as to expand commodity production and stimulate the province's economy. He proposed 8 measures to improve commodity circulation including a measure laying down that, except 11 major industrial products, all light industrial products should be freely sold and bought without quota system and that price control should be flexible. [Hefei Anhui Provincial Service in Mandarin 1100 GMT 21 Oct 80 OW]

HEILONGJIANG LIGHT, TEXTILE INDUSTRIES--Light industrial and textile enterprises in Heilongjiang have accelerated their production. In the first 9 months of 1980, their total output value increased by 28 percent over the figure in the corresponding 1979 period, while the total output value of heavy industrial enterprises increased by 0.4 percent. The light industrial and textile enterprises prefulfilled their annual profit plan by 3 months, earning 61 percent more profits than they did in the January-September period 1979. [Harbin Heilongjiang Provincial Service in Mandarin 2200 GMT 14 Oct 80 SK]

CSO: 4006

CONSTRUCTION

BRIEFS

LIAONING TERMINAL PORT BUILDING--The five-story Dalian Port terminal building, designed and constructed by Chinese, has been completed. A 10-story high tower on the building is designated as an electronic computer room and on top of the tower are 3 automatic clocks. The total acreage of the building is 17,400 square meters. [Shenyang Liaoning Provincial Service in Mandarin 2200 GMT 15 Oct 80 SK]

LIAONING CITY CONSTRUCTION--Shenyang Municipality promulgated new measures on city construction 17 October, urging control of the development of big cities and encouraging construction of small cities and towns. The city population in Liaoning Province is supposed to be kept at under 2.5 million in 1985. [Shenyang Liaoning Provincial Service in Mandarin 2200 GMT 17 Oct 80 SK]

TIANJIN HOUSING CIRCULAR--The Tianjin Municipal Government issued a circular 9 October on dismantling temporary houses. The circular states: 1) Temporary houses built by any units or individuals without the approval of district administration bureaus must be dismantled; 2) District urban construction bureaus must dismantle all houses built in public places or on streets; 3) Houses not dismantled within the deadline must be dismantled and their owners be fined 10 to 20 yuan a day; 4) Those violating these regulations will be educated, warned, fined, detained or given criminal sanctions according to the seriousness of their cases; 5) The circular on dismantling temporary houses issued by the former municipal Revolutionary Committee on 8 May 1979 is valid; 6) Pertinent departments should cooperate with district governments in the implementation of the circular and; 7) All departments, organizations and enterprises should educate their staff and workers to obey the relevant regulations. [SK240637 Tianjin City Service in Mandarin 0030 GMT 18 Oct 80 SK]

TIANJIN HOUSING PROBLEM--The Tianjin Municipal People's Government held a meeting at Tianjin University on 22 October to mobilize residents of living quarters at Tianjin's three major universities to dismantle their temporary houses and move to new houses built for them. Mayor Hu Qili addressed the meeting. He promised that the municipal CCP committee and people's government would do their best to solve problems in the people's daily lives and urged them to take the interests of the whole into account and cooperate with the government. Representatives of the school residents pledged to evacuate their temporary houses by 10 November. [SK230954 Tianjin City Service in Mandarin 0030 GMT 23 Oct 80 SK]

TIANJIN DORMITORY PROBLEMS--Allowing people to raise funds and arrange materials and labor for the construction of workers dormitories is an effective way to bring every positive factor into play to accelerate urban housing construction. However, in the course of covering such activities, this reporter has heard complaints from many quarters. People have said: "This work faces layers upon layers of barriers. Sometimes it is accomplished only by bribery. People have much to worry about in this work." Why are the people worried? The general view is that there are no specific regulations governing dormitory construction. When a construction project is approved by one department, it is later rejected by another. Words often replace policies. Others complain about the elaborate procedures to get a project approved, weak organizational leadership and the unavailability of building materials and land. Many units are appealing to the municipal departments concerned to strengthen their leadership over the people's construction of workers dormitories, to enact relevant policies, to improve the management and to simplify the procedures in order to accelerate the construction of such dormitories." [Excerpts] [SK241125 Tianjin City Service in Mandarin 0030 GMT 24 Oct 80]

CSO: 4006

LABOR AND WAGES

BRIEFS

NEI MONGGOL BUSINESSMEN-INDUSTRIALISTS FEDERATION--The Second Standing Committee Meeting of the Fourth Nei Monggol Regional Federation of Businessmen and Industrialists was held between 7 and 9 October in Hohhot. The meeting heard a report on the work of the federation and discussed work in the future. The meeting contended that helping the party and government develop collective economy and place jobless youths is of great significance to develop production, invigorate market and consolidate and develop the political situation of stability and unity. Former businessmen and industrialists should give full play to their special knowledge and experiences in managing small and medium-sized enterprises. Efforts should be made to mobilize and organize them to run all kinds of collective enterprises and labor service trades. [SK210711 Hohhot Nei Monggol Regional Service in Mandarin 1100 GMT 14 Oct 80 SK]

CSO: 4006

IMPORTANCE OF INLAND WATER TRANSPORTATION EXPOUNDED

Beijing RENMIN RIBAO in Chinese 29 Aug 80 p 3

[Article by Pan Jiahua [3382 1367 5478] and Qu Qiyun [4234 0796 6663]: "Many Problems With Inland Water Transportation"]

[Text] We recently visited concerned units of inland water transportation and felt that there are serious problems which are urgently in need of solution.

The natural conditions of this country are sufficiently favorable for inland water transportation. There are more than 5,800 natural rivers, with a total length of 430,000 kilometers. However, for a very long time, there have been plans to manage and utilize these natural rivers. Worse, the inland water transportation mileage has dropped from 172,000 kilometers in 1961 to 108,000 kilometers today. Not a few historically navigable rivers either are no longer navigable or are navigable only in sections seasonally.

Why cannot inland water transportation grow? The main reason has been a lack of understanding of its importance and consequently a lack of action and measures taken. Over the past 30 years, the basic construction investment on navigation routes over the entire nation (except for the Changjiang trunk line) has amounted to only 820 million yuan, equivalent to one-fortieth of investment in railroads. Due to lack of funds, many waterways could not be repaired, and as a result, navigational routes have become blocked by sedimentation and have been closed to navigation. The navigable course of some of the rivers has become narrower and narrower and the navigational power of the river weakened as a combined result of erosion, dumping of household refuse, and coal slugs. Other navigational equipment and installations cannot get proper maintenance, so waterway transportation cannot fully demonstrate its effects and benefits.

Secondly, there has been a lack of coordinated utilization of the water resources. Dams and docks along the length of rivers have been constructed in a haphazard fashion. Since the establishment of this nation, many river engineering projects have been accomplished, but the great majority of these projects belonged to single-item exploitation which neglected transportation completely. In recent years, more than 2,400 dams and docks which prevent navigation have been built on rivers all over the country. One-tenth of such construction has been made on important navigable waterways, and this has disabled many rivers for navigation.

The present management system presents another obstacle to inland water transportation. Except for the Changjiang, all inland rivers of this country are under the control of the local government. Thus, a river is artificially divided into many segments. Take the 847-kilometer-long section of the Xijiang between Nanning and Guangzhou for example. This river is quite navigable, but the river is managed by two different governments, with Wuzhou as their boundary. The freighters navigating this river on either section must stop at Wuzhou, unload, and then reload on the other section of the river. Thus, not only is the transportation time lengthened, but transportation costs are also hiked.

Inland river transportation is characterized by the large capacity it can handle and its relatively low cost. The load-carrying capacity of a ship is 3 to 8 tons per horsepower. It is 1 to 3 tons per horsepower for a train, and only 0.1 ton per horsepower for an automobile. Maintenance of a navigational route costs only one-third to one-fifth the cost of building a new railroad of the same length. Repairing waterways has other general benefits as well, including, for example, flood control, hydroelectric power generation, water transportation and irrigation. Take, for example, the section of the Beijing-Hangzhou Canal situated in northern Suzhou, which was repaired in 1958 with a total investment of 270 million yuan over a total length of 404 kilometers. A canal which used to be able to pass only wooden boats was transformed into a waterway on which 2,000-ton ships can navigate. Thus, the annual transportation volume increased to 17 million tons. In addition to this, it has achieved flood control of the area, guaranteeing the safety of 15 million mu of land and 7 million people in the Lixiahe area. It has also enlarged the irrigation area by more than 3 million mu and the drainage area reaches more than 1,000 square kilometers.

With the progress of construction of the four modernizations in this country, inland water transportation becomes more and more important. We would like to suggest that the concerned government department should plan a series of guidelines and laws to facilitate unified planning and unified construction, rational utilization of water resources, and management and maintenance of the rivers and waterways of this country. The existing dams and docks which prevent navigation should be redesigned and reconstructed, according to the urgency and complexity of the work, so that navigability of the rivers may be restored. The inland water transportation management system must also be reformed. A river should not be managed according to administrative divisions. At the same time, plans for artifically constructed canals must be carefully and aggressively made, in order to achieve step-by-step a navigational network which crisscrosses the nation. Let the inland water transportation play an even more important role in our modernization construction.

9113
CSO: 4006

TRANSPORTATION

BRIEFS

JIANGSU EXPRESS WATERWAY--An express waterway was recently established through No 6 opening of the Changjiang River bridge at Nanjing in order to speed up inland navigation. Test navigation between 15 and 17 October turned out to be very successful. Over the past 10 years, the only waterway between Nanjing Port and Shanghai is through the No 8 opening of the Changjiang River bridge. The new express waterway will not only speed up traffic but will also reduce accidents. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 17 Oct 80 OW]

CSO: 4006

GENERAL

BRIEFS

JIANGSU EXHIBITION--The Jiangsu Provincial Exhibition on the achievements in popularizing the "overall planning method" and the "optimum seeking method" opened at the Nanjing Workers Cultural Palace on 14 October. During last April and May, Hua Luogeng, famous mathematician and vice president of the Chinese Academy of Social Sciences, led a team of workers to Jiangsu to popularize the two methods, thereby vigorously promoting the movement to increase production and practice economy in the province's industrial and communications departments. By adopting these two methods, the province has saved 15.21 million kwh of electricity, 8,100 dun of fuel oil, 53,000 dun of coal, more than 2.5 million jin of grain and 2.28 million jin of cooking oil. Wang Binshi, member of the provincial CCP committee Standing Committee and vice provincial governor, has visited the exhibition and given specific instruction on popularizing the two methods. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 14 Oct 80 OW]

HEBEI REGULATIONS--The Hebei Provincial People's Government recently issued regulations regarding policy on developing urban commercial businesses. The regulations pointed out: It is necessary to provide more opportunities for collective businesses. Factories, mines, organs, schools and enterprises can run collective businesses or cooperatives. In order to promote urban commercial businesses. The Hebei Provincial People's Government also issued a circular, urging people's governments at all levels to relax policy and strengthen leadership over collective businesses. [Shijiazhuang Hebei Provincial Service in Mandarin 0430 20 Sep 80 HK]

HEBEI COUNTY ENTERPRISE MANAGEMENT--Qianxi County of Hebei Province has done well in implementing the profit contract system in industrial management reform in the first quarter of the year. However, the successful contract system was stopped in April and people were not allowed to sign contracts for the second quarter. This discouraged the workers and immediately lowered the production value and profits. Although the third plenary session encouraged people to emancipate their minds and carry out reforms, some comrades were still backward and were not bold enough to do so. Thus, development and reforms were hindered. This was why the successful profit contract system was stopped in Qianxi County. We must change such phenomena as soon as possible in order to reform state economic management. [Shijiazhuang Hebei Provincial Service in Mandarin 0430 GMT 21 Sep 80 HK]

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